WESTERN STATES EDITION

DOMESTIC ENGINEERING

Whole No. 684. Chicago and New York, Saturday, January 20, 1906 Vol. XXXIV. No.3. $1.00 a Year

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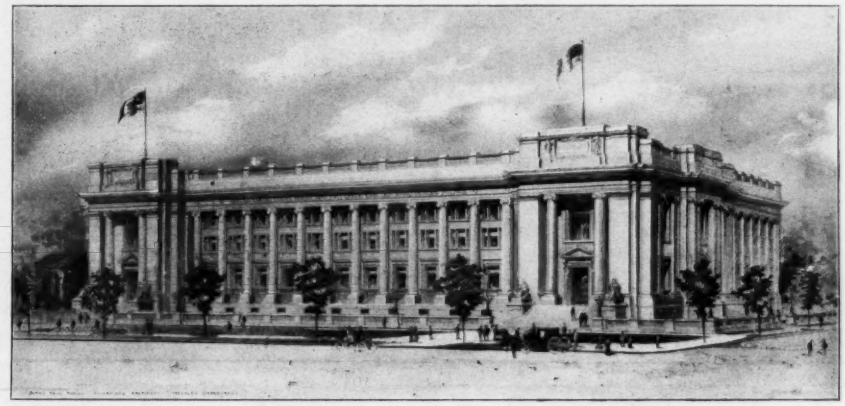

NEW UNITED STATES GOVERNMENT BUILDING AT INDIANAPOLIS, IND., warmed by 18,158 square feet of AMERICAN Radiation. Installed by Jos. McWilliams & Co., of Louisville, Ky. Rankin & Kellogg, Philadelphia, Architects, associated with James Knox Taylor, Supervising Architect of the Treasury Department.

AMERICAN RADIATOR COMPANY

General Offices, 282-284 Michigan Avenue, Chicago.

See Page 29 for Addresses of Sales Branches.

JENKINS BROS.' VALVES

Honestly manufactured. Fully guaranteed. To be sure that you are getting the genuine, see that the valves you buy are stamped with trade mark as shown in the cut.

JENKINS BROS., New York, Boston, Philadelphia, Chicago, London

F. E. CUDELL'S
Sewer Gas and TRAP Backwater
(Patented)
For Wash Bowls, Sinks, Bath and Wash Tubs
Put into the White House by the United States Government
For Venting use Vent Trap. CLEVELAND, O.

RELIABLE CONNECTIONS made between Lead and Iron Pipe by using the Raymond Ferrule—the only Lead Ferrule on the market which has an **extra thickness of lead over the shoulder,** giving strength where it is needed and where other lead ferrules are **weak.**

The Genuine Article Bears Our Label.

RAYMOND LEAD CO.

Crosby Spring Seat Globe and Angle **Valves** All Parts Interchangeable. All Parts Removable. Tested for Highest Pressures. **Leak-Proof** CROSBY STEAM GAGE & VALVE CO. Boston New York Chicago

HOLLAND RADIATORS

Bremen Eclipse
Reliance Unique

DIRECT DIRECT-INDIRECT INDIRECT WINDOW
AND ALL SPECIALS

WRITE US FOR DESCRIPTIVE MATTER AND PRICES

HOLLAND RADIATOR COMPANY

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38 DEARBORN STREET

WORKS
BREMEN, INDIANA

COMPLETE STOCKS CARRIED AT FOLLOWING POINTS:

Indianapolis, Indiana, Central Supply Co.
Cleveland, Ohio, Standard Mfg. Co.
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Milwaukee, Wisconsin, The Robert Rom Co.
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A VALUABLE SUPPLY
IN EVERY SHOP
DIXON'S GRAPHITE
PIPE JOINT COMPOUND.
Send For Booklet and Free Sample.
JOSEPH DIXON CRUCIBLE CO., Jersey City, N. J.

MALLEABLE AND WROUGHT PIPE HOOKS AND STRAPS

Complete stock of every size and kind. Quality the best that can be made. B. B. Ornamental Pipe Straps, all even, clean cut, brightly tinned.

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BERGER BROS. CO.
231-237 ARCH ST., PHILADELPHIA, PA.

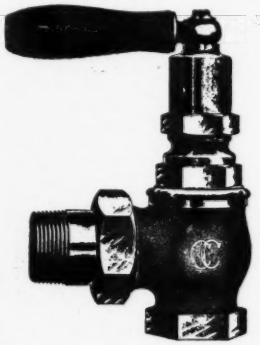
REGULATORS
STEAM
WATER

Ross Valve Co.

TROY, N. Y.

INDEX TO ADVERTISEMENTS ON PAGE 52.

CRANE QUICK OPENING SELF-PACKING RADIATOR VALVES



NO. 228.

These valves are the highest type of Radiator Valves on the market, they can be opened or closed with a half turn and having a lever handle are easily operated by either the hand or foot.

The Self-Packing feature precludes any possibility of these valves leaking at the stuffing boxes, thus saving from ruin expensive carpets and rugs, and the spotting and warping of fine oiled, hard wood floors, and the general annoyance caused by leaky stuffing boxes.

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MINNEAPOLIS
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SAN FRANCISCO
OAKLAND
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GURNEY

HOT WATER HEATERS STEAM BOILERS, RADIATORS.

UNEQUALLED FOR EFFICIENCY

There is a "Gurney Heater" for every heating requirement. One quality runs through them all—THE VERY BEST. The prices however are no higher than for many lower grades of heaters.

Send for latest Catalogues.

GURNEY HEATER MANUFACTURING CO.

N. Y. BRANCH 111 FIFTH AVENUE, NEW YORK.

74 FRANKLIN STREET. BOSTON.

OUR DISTRIBUTING AGENCIES INSURE PROMPT SERVICE.

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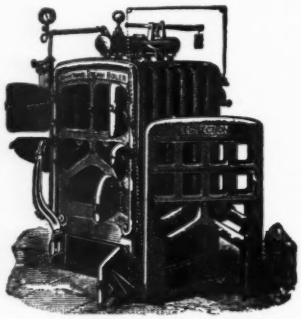
THE FIRST BEST

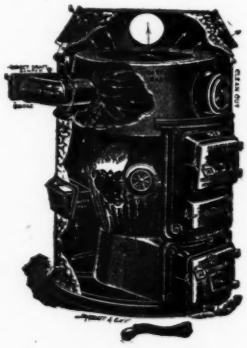
It's easy to say our hot air furnaces, steam and water heaters are the best—anyone can say that, but our record since 1849 warrants us in claiming superiority.



Steam Heater

PIONEER

THE BEST FIRST



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Great variety and large stocks to draw on.

The Boynton Furnace Co.

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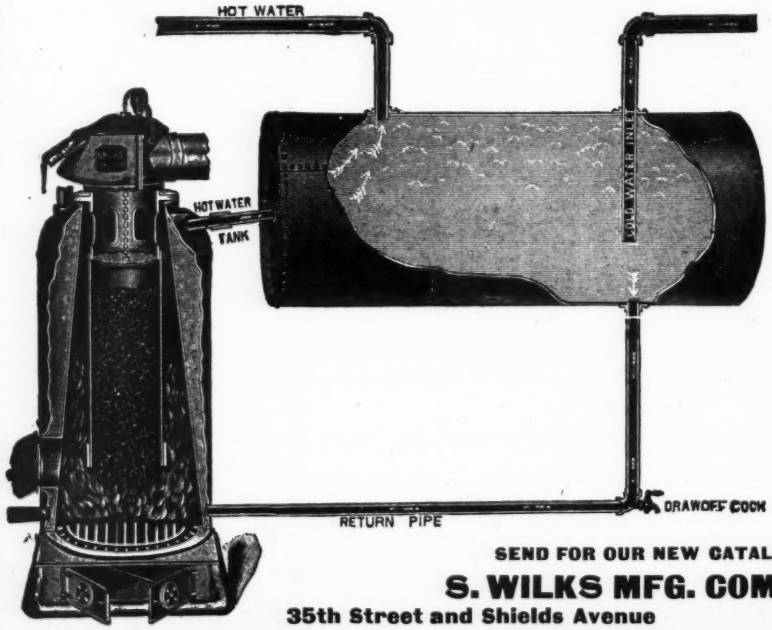
HEATERS

ALWAYS THE BEST

WILKS HOT WATER HEATERS



For Heating Water for

Residences, Apartment buildings, Hospitals, etc.

Steel Storage Tanks

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S. WILKS MFG. COMPANY

35th Street and Shields Avenue CHICAGO, ILL.

READ THE ADVERTISEMENTS

FIG. 244 C. Screwed.

THE KELLY & JONES CO.,

Manufacturers of

Brass and Iron Valves, Cast Iron and Malleable Fittings,

Brass and Iron Cocks, Etc.
Steam and Hot Water Heating Specialties.

Works: Greensburg, Pa.

New York **Chicago** **Pittsburg**

FIG. 244 D. Hose Valve.

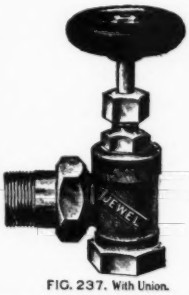

FIG. 237. With Union.

NO. 3.

FIG. 248.

Steam Trap

NO. 1.

FIG. 243.

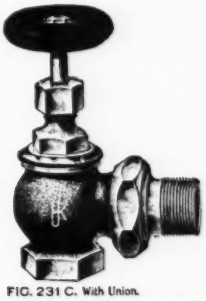

FIG. 231 C. With Union.

MUCH of the satisfaction resulting from the use of the "Humber" Hot Water Heater is due to its simplicity of construction. Few parts—and every part treated as a special feature.

To Explain

Easy to Sell
Easy to Understand
Easy to Operate

and we think this explains why it is easy to sell so many of them. Positive and rapid circulation. More grate and fire surface than it needs to carry the listed ratings, but that is the way we make all our boilers and radiators—a little better than seems necessary. This sort of business practice on our part, does not hurt the fitter a bit. All styles and sizes Hot Water and Steam Boilers, "Seneca" adiators for both Steam and Water.

THE J. H. McLAIN COMPANY

WORKS AND GENERAL OFFICE, CANTON, OHIO.

Branches: Cleveland, Indianapolis. Crane Company, Selling Agents.

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The "LOEW" Adjustable Die Stock

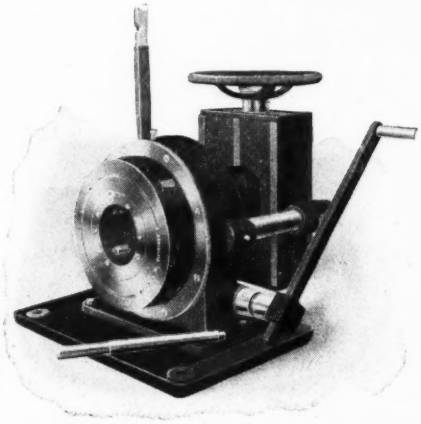
Simple Durable Quick Efficient

	Net Price.
No. 1, ¼ to 1 inch - - - -	$5.00
No. 2, 1 to 2 inch - - - -	8.00

The "Loew Victor" Pipe Machine

ONE MAN CUTS 4 in. PIPE WITHOUT USE OF RATCHET HANDLE.

Can be set up in any shop or carried with ease to job.
Solidly built—Practically indestructible. No weak parts.
Price is right. WRITE FOR CATALOGUE G D P.



The Loew Mfg. Co., Cleveland, O.

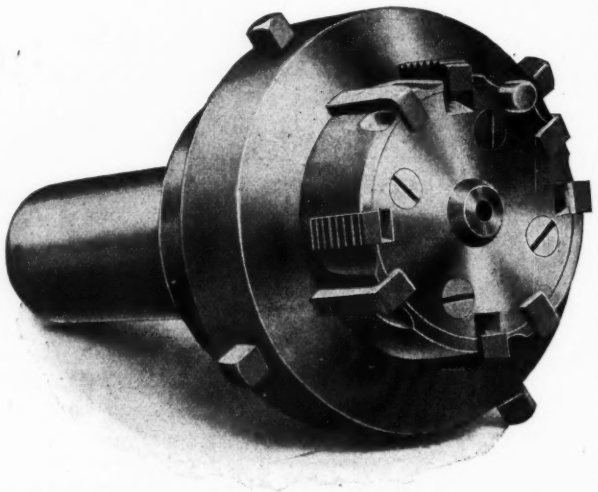
The Murchey Patented Automatic Collapsing Tap

will tap to the bottom of cast iron caps, or thread close to a shoulder.

THE GAUGE ROD is so arranged that it positively prevents the tap from running against the shoulder or bottom of article being tapped, as it AUTOMATICALLY COLLAPSES the chasers and thus permits the tap to be withdrawn without necessity of stopping or reversing machine. Can be made in all sizes, and is adapted to all kinds of special work.

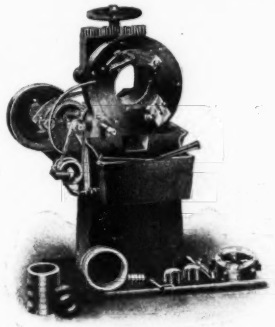
We will be pleased to furnish NET PRICES on application.

We also make Murchey automatic nipple and pipe threading machines, and will gladly send our catalogue to those interested.



Kenneth Anderson Mfg. Co., 33-37 Atwater St., Detroit, Mich.

Combined Hand and Power Threading and Cutting-Off Machine



This machine has our standard adjustable quick opening and closing die heads and our improved cutting-off knife. The chasers can be sharpened by grinding and readily replaced by chasers cutting any style or pitch of thread, either right or left. The best and most rapid combination machine on the market.

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TOLEDO, OHIO U. S. A.

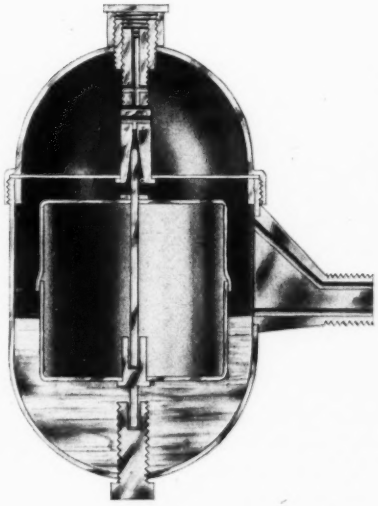
Have you tried it yet?

Better Work—Less Cost

For all who use the "Nye Die"

Nye Tool & Machine Works

196-198 S. Clinton St., CHICAGO



Cut Expense

You can save anywhere from 7 to 25 per cent on coal consumption by installing

The DURAM Automatic Vacuum Air Valve No. 3

This new air valve is a radical departure in air valve construction. It is a complete one-pipe vacuum system all in itself. It combines the regulation of a water system with the low first cost of a steam system, saving from 7 to 25 per cent in fuel.

Just send for a sample, and if it does not do all we claim, and more, send it back at our expense.

The Schott Specialty Co., Marquette Bldg., Chicago

MENTION DOMESTIC ENGINEERING

SHAMED TO TELL YOU

how much we're "snowed under" on superior Drop Forged Stuff—particulary on

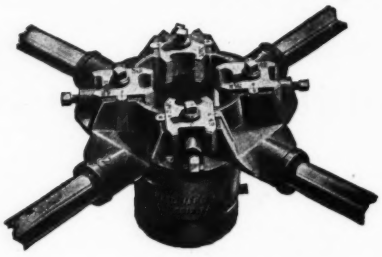
VULCAN CHAIN PIPE WRENCHES AND VISES

Oh! yes indeed, working nights too!

Try the Stores.

J. H. WILLIAMS & CO.

BROOKLYN **CHICAGO**



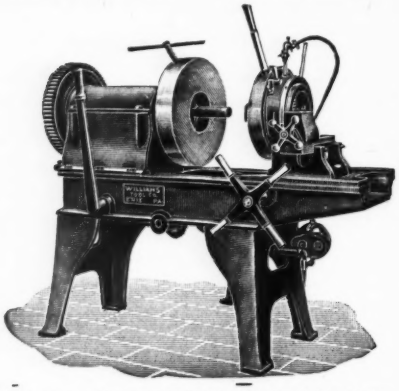
Quality First.

We don't make the cheapest stocks and dies on the market, but we do make the best and sell them cheaply. Threading steel pipe is trying work on dies, and the very best quality of steel is none too good. We'll guarantee that the easy cutting and lasting qualities of our dies will give you food for thought. Catalogue "D" tells you all about them as well as other high quality tools.

Reed Mfg. Co., Erie, Pa.

WILLIAMS TOOL CO.

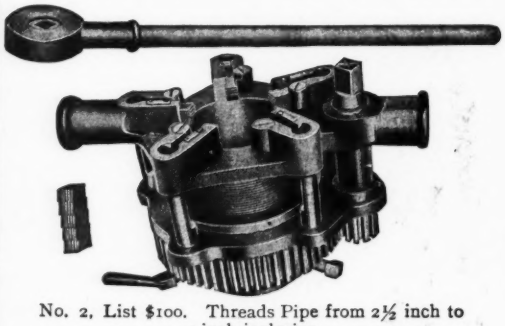
Williams No. 3 Pipe Machine



Is a strong substantial tool that will cut and thread pipe from 1½ inches to 6 inches. It is a rapid worker, is equipped with Quick Opening Adjustable Dies and has six changes of speed without removing or replacing gear. *Send for Circulars and Prices.* We build Pipe Machines cutting from ¼ to 12 inches.

ERIE, PENN.

"TOLEDO" Pipe Threader



No. 2, List $100. Threads Pipe from 2½ inch to 4 inch inclusive.

With this device one man can thread

2½ in. Pipe in 1 minute, 3½ in. Pipe in 4 minutes,
3 " " 1½ " 4 " " 6 "

Discount Furnished on Application.

This tool weighs but 60 lbs.; is strong and durable, yet light enough to permit of its being carried from place to place on outside work. Send for descriptive catalogue.

THE TOLEDO PIPE THREADING MACHINE CO.

TOLEDO, OHIO, U. S. A.

READ THE ADVERTISEMENTS

A Pipe Wrench, A Monkey Wrench and a Rachet Wrench, All in One

Bullard Wrenches

Never Fail

In any kind of a place
On any kind of a job

Bullard Automatic Wrench Co.

Office & Factory: 257 W. Exchange St., Providence, R. I.

"Trimo"

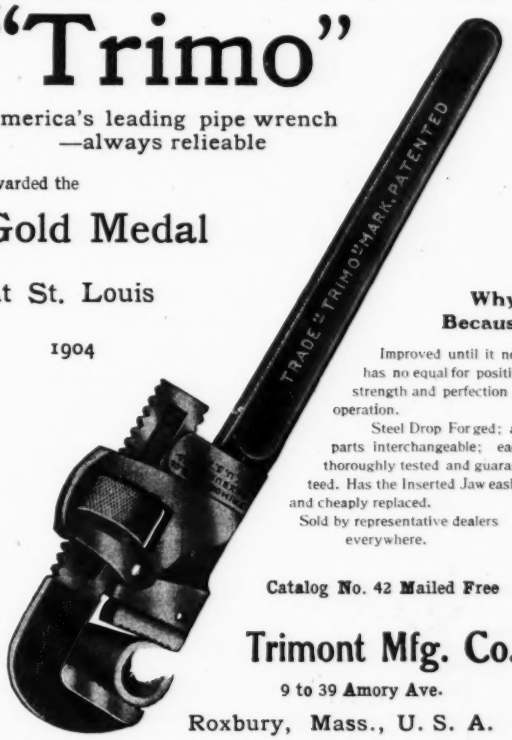
America's leading pipe wrench
—always relieable

Awarded the

Gold Medal

At St. Louis

1904



Why? Because

Improved until it now has no equal for positive strength and perfection of operation.

Steel Drop Forged; all parts interchangeable; each thoroughly tested and guaranteed. Has the Inserted Jaw easily and cheaply replaced.

Sold by representative dealers everywhere.

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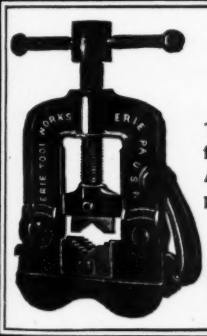


Malleable Iron Pipe Vises

The most complete line of hinged frame malleable pipe vises made. All steel kit pipe vises. Open frame pipe vises.

Jobbing Trade Only

ERIE TOOL WORKS
ERIE, PA.

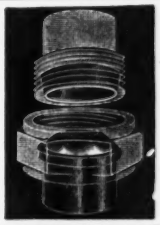
WARNOCK

The Only Sure Tool for Nickeled Work
NO SCRATCH SURE GRIP

Warnock Mfg. Co.
WORCESTER, MASS.

FF

"Flagg" Malleable Fittings
"Flagg" Keystone Unions
THE STANDARD SOFT METAL SEAT UNION



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PIPE JOINT COMPOUND

For all Steam, Gas, Water, Compressed Air, Oil, Brine and Ammonia Pipe-Joint Threads

THE ALAN H. TRIPP CO.

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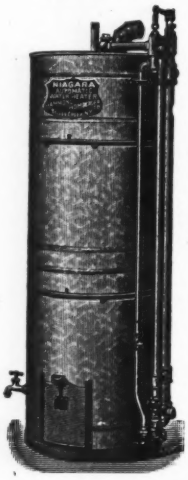
IF YOU DON'T CARE

Uses Natural or Artificial Gas.



anything about results, any old heater will do. But if you want the one that will always give satisfaction, one that will always be a good advertisement for you, then handle the

Niagara Automatic Water Heater

The Niagara Automatic Water Heater will maintain the temperature at any desired degree at all times, and work perfectly automatically, the thermostat turning on the gas whenever the hot water is drawn, and shutting it off as soon as the inflowing cold water is raised to the required temperature.

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SILVER CREEK, N. Y.

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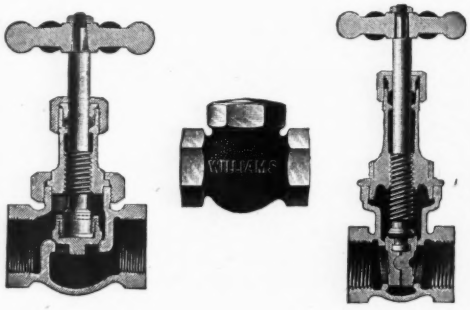
Ruud Mfg. Co.

PITTSBURG, PA.

Branches in all large cities.



The "Williams" Regrinding and Double Disk Gate

VALVES

are guaranteed to be the best on the market.

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The D. T. Williams Valve Co.

CINC NATI, OHIO, U. S. A.

PITTSBURGH VALVE & FITTINGS COMPANY

GENERAL OFFICE

FRICK BUILDING, PITTSBURG, PA.

MANUFACTURERS OF

Fittings, Valves, Cocks, etc.

Works, Barberton, Ohio

ADDRESS ALL COMMUNICATIONS TO THE GENERAL OFFICE.

Pittsburgh, Pa.

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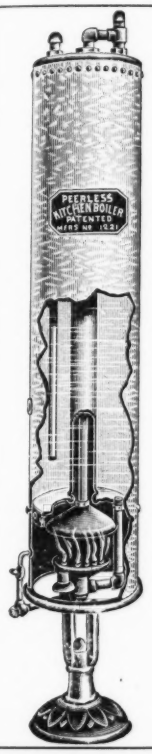


Your Brother Plumbers

are even more enthusiastic over the many merits of

The Peerless Kitchen Boiler

than we are. We have a mass of the most flattering testimonials from them, from all over the country. This boiler is a range boiler containing its own heater and when the consumer moves he takes it with him. A good thing for plumbers to encourage.

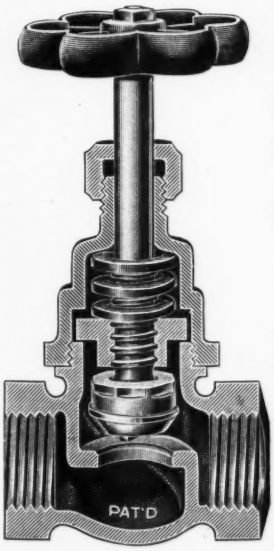
Hot Water, Two Minutes—Hot Bath, Two Cents

Write us

Peerless Kitchen Boiler & Supply Co.

Telephone, Central 1840 — 35-37 Randolph Street, Chicago.

CUT OUT ALL REGRINDING by using the Swenson Self Grinding Valve



It grinds itself perfectly and automatically while being opened and closed.

It has a metal seat and metal disc, and is practically everlasting.

Send for catalog today.

SWENSON VALVE CO., Cresco, Ia.

Herbert Boiler Co.

MAKES

Herbert's

Smoke Consuming Boilers
Double Shell Draft Tube Boilers
Magazine Feed Boilers
Magazine Feed Hot Water Heaters
Detachable Fire Box Boilers
Drum Draft Smokeless Water Tube Boilers

And Boilers, Furnaces and Heaters for any Purpose and of any Capacity.

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240 Root St., Chicago

MENTION DOMESTIC ENGINEERING

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A Boiler with a Good Digestion:

This is a boiler which can turn all the coal fed into it into good heat units and clean clinkerless ash. How much fuel is wasted in boilers with imperfect combustion? Enough to make Rockefeller green with envy. "The Eclipse" steam and hot water heaters are a good proposition for the fitter. No complexities in construction and satisfaction in operation.

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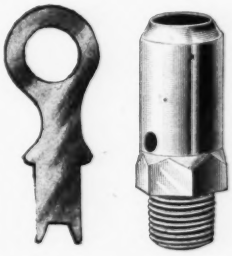
THIS VALVE WILL APPEAL TO YOU

This is Russell's Improved Compression Air Valve. Made both with wood wheels and to be used with keys. It is a valve that appeals to the thinking fitter. It is mechanically perfect, made from brass rod, and the stem cannot be removed by thoughtless persons. After the valve is opened full the stem engages on a bonnet, which prevents it from coming out and allows it to revolve at the operator's will. It will enter and close tightly as in common valves.



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The Powers Heat Regulators

FOR

Hot Air Furnaces

Low Pressure Steam

Hot Water Boilers

Hot Water Tanks, etc.

Simple Automatic Reliable

The Money Makers

THE POWERS REGULATOR CO.

40 Dearborn Street, CHICAGO

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When you buy a hot water regulator, buy the best—

D & R

Hot Water Regulator

Used and recommended by the leading Architects, Engineers, Steamfitters, Plumbers, etc.

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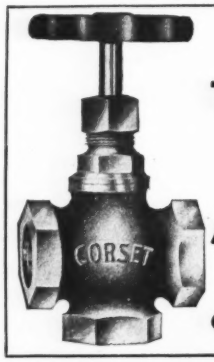
Davis & Roesch Temperature Controlling Co.

NEWARK, N. J.



Send us a TRIAL ORDER

Will take chances on the result.

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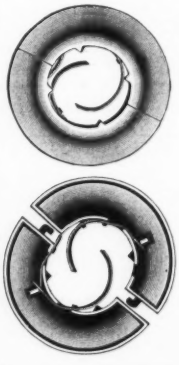

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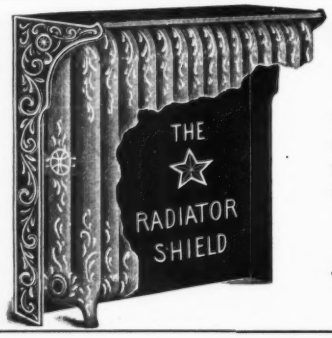

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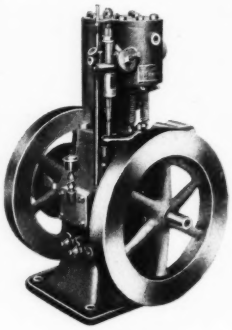

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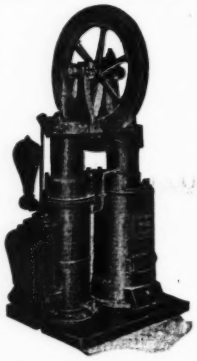

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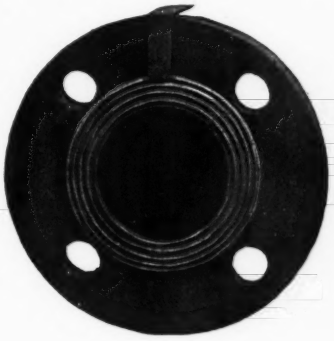

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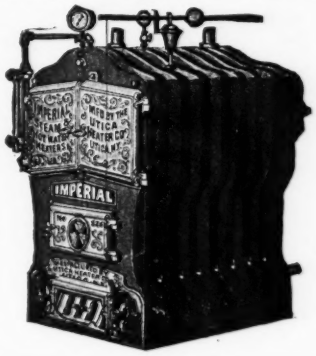

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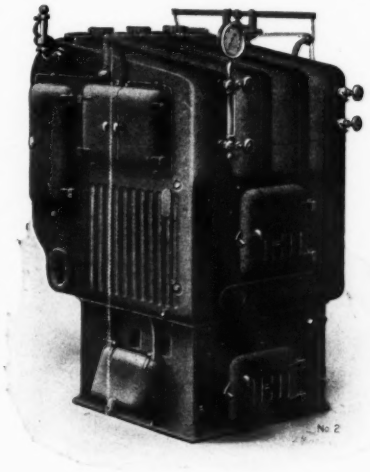

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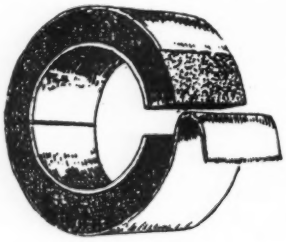

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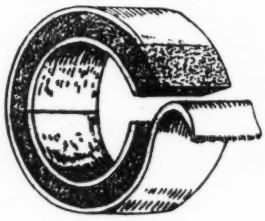

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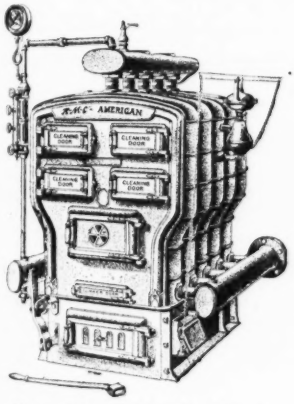

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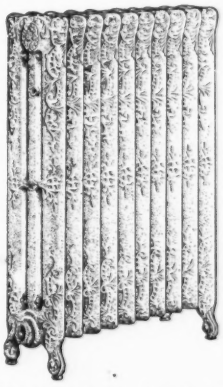

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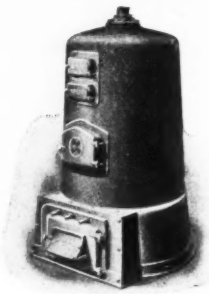

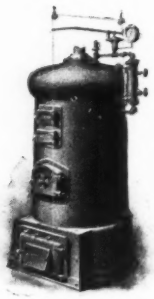

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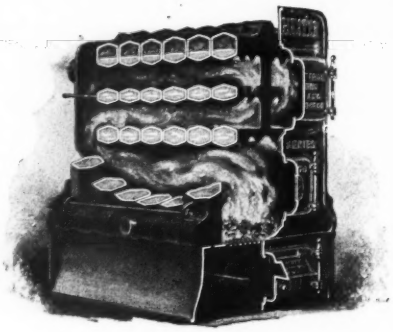

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MODERN PIPE FOUNDING.*

To get an adequate idea of a modern industry one must go to a primary market where all streams of commerce converge, and when one does this the result, regardless of the industry, is pretty apt to be a source of astonishment, at its magnitude. Of no industry is this more true than pipe founding. This feeling begins when looking at the stock piles which meet the eye on entering a pipe foundry; it grows when noting the rate at which additions are made to the accumulated stock and when this is multiplied by the number of similar foundries in the country the feeling becomes one of simple amazement that such an output can be absorbed. Those who have had a life-long connection with this industry tell me that a conservative estimate would place the amount of gray-iron pipe made in this country at 2,000 tons per day.

No industry is more highly organized and systematized and it is, moreover, strenuous to the last degree, there being few more exhilarating sights than a pipe foundry at work. The workmen are chiefly negroes, the sunny good temper of which race is nowhere seen to better advantage. The work is, of course, hot and dirty, and no one who has seen the sustained activity which pipe-foundry workmen maintain from day to day and the cheery willingness with which they do it will ever again have much patience with those who look upon the negro race as slothful and indolent.

The whole interior of a pipe foundry is one bustle of activity, but of all those engaged the man who releases the clamps by which the molds are held together is, perhaps, the star performer. The flasks are of iron, each containing from one to three molds according to the size of pipe. The halves are hinged and are so hung as to open to their own weight and drop their contents. They are prevented from doing this by a series of U-clamps driven over their flanges—three on the lower edge and two on the upper. As the flask is lifted from the pit by the crane and by a bail chain, connected near the middle lengthwise of the flask's length but long enough for it to swing vertically within the bight, a workman stands alongside with a light sledge and before the hoist is completed the two clamps on the hinge side of the flask are off. Perhaps they drop into the pit and perhaps elsewhere, but no matter. The supply is large enough to prevent a few being missed, time is precious and those going into the pit may be recovered later. The loaded mold rises but it does not stop, and as the crane completes the lift the mold tilts to a horizontal position and without pause the crane swings it to the discharge side of the building. Before it gets there as it passes above the workmen's heads, two of the lower clamps have received attention and but one remains to hold the halves of the flask together.

A race between flask and workman to the discharge point of the building follows, but it is a tie. Both arrive there together and simultaneously the tap of a crowbar releases the last clamp and the flask is emptied of its contents—the hot pipe on a pair of ways, by which it rolls down to the dipping tank and testing machine, and the sand accumulating for attention when the day's melt is finished. The flask is scarcely empty before it is again hoisted and swung back, the workman, more likely than not, running one end of his bar under the hinge bolts, grasping the other with his hands and riding with it through the air above his fellows' heads to be dropped with the flask to the floor, where the clamps are replaced and the flask lifted again and swung to another position ready to be rammed up again for a repetition of the operation.

The rigid specifications to which pipe is now made and the exacting nature of the tests for which these specifications call have introduced the chemist and his laboratory as an essential part of a pipe foundry. Pipe is now regularly cast from mixtures of iron, which are made up with a view to the chemical analysis of the product, this mixture being obtained by systematic piling of stock. Each pile of pigs represents a carload which has been numbered, sampled and analyzed and its analysis recorded. There is, however, no weighing of the pigs in making the mixture. The average weight of a pig is easily obtained and is sufficiently uniform to enable satisfactory mixtures to be made by counting the pigs. In making up his carload the workman is therefore instructed to take a given number of pigs from piles of designated numbers.

Pipe is always cast on end and usually in a circular pit equipped with jib cranes. The molds made the previous day, as rammed up are deposited over a furnace with an opening for each one, through which the furnace gases pass to dry the molds—each mold having a perforated plate laid over its top to prevent a too active draft.

At the beginning of operations each morning the molds are removed from the furnace top and placed upright in the narrower part of the pit, the cores are inserted and the molds made ready for pouring. After pouring, the gymnastic performance, which I have endeavored to describe, is gone through. After dumping the pipe and reclamping the flask the latter is placed in the far side of the pit, with the patterns in place, where they are again made ready to go on the drying furnace. Each pit has two jib cranes, one of which serves the casting and the other the molding side of the pit. The methods described in the foregoing paragraphs are typical of the general

*Reproduced by courtsey of the American Machinist.

practice. In the enlargement of the plant of the Dimmick Pipe Foundry at Birmingham, Ala., which is now being built, and which is intended for the largest sizes of pipes, the arrangement will be entirely different. The circular form of pit is, in fact, abandoned, the pit being rectangular and served by a traveling crane. The arrangement will also be such as to involve fewer transfers of the molds in the pit.

On the way to the testing machine the pipe passes the dipping tank, into which it is dipped after heating in an oven provided for the purpose.

The testing apparatus consists of a hydraulic press, by which the pipe is squeezed endwise to make water-tight joints at its ends, one end being open to the water main, an entire rearrangement of the crane system and a mechanical rammer.

Figure 1 gives an idea of the turntable, in suitable recesses of which the flasks are secured. The turntable is always full, an empty flask being placed in position as a full one is removed, the operation of molding, drying and pouring going on simultaneously in different parts of the circle. The molds at the left have been poured, those in the middle are ready for pouring and those at the right are ready for inserting the cover.

A furnace for drying the molds is located below the turntable and occupies a part of its circumference between the molding and pouring portions. From time to time the apparatus is turned about its axis by a capstan

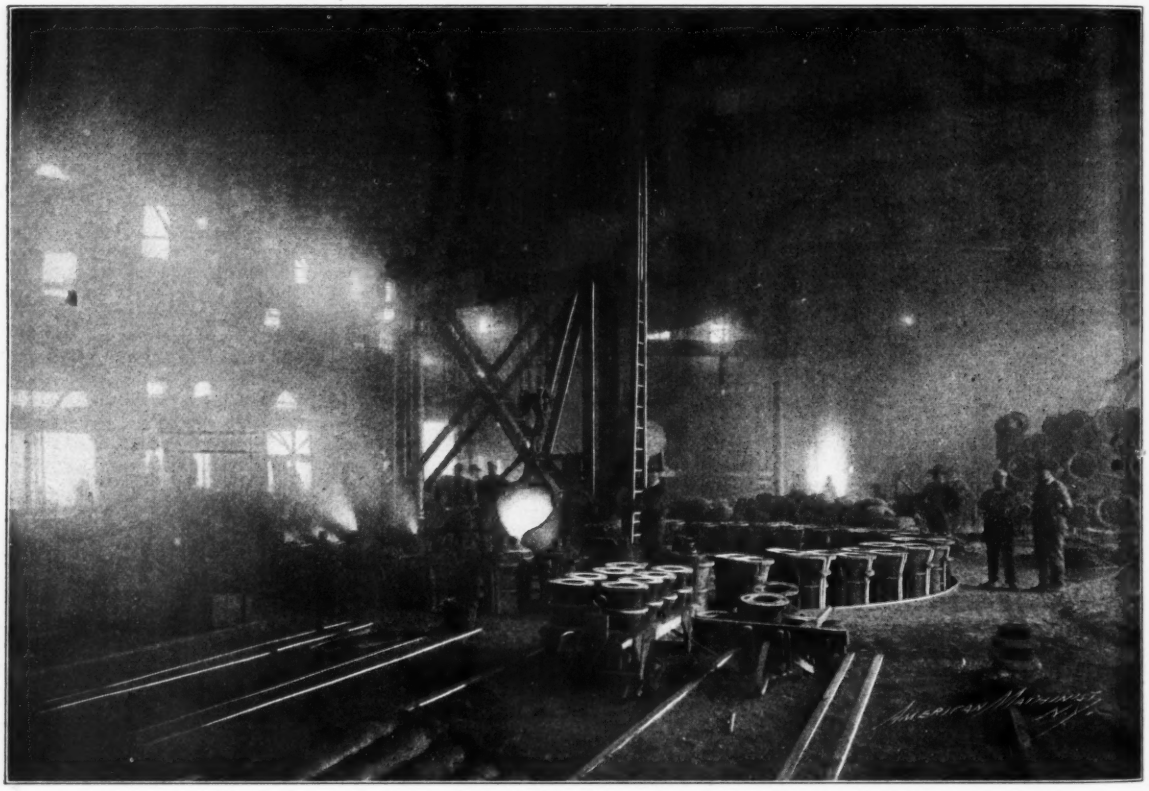


FIG. 1. POURING PIPE AT THE CHATTANOOGA FOUNDRY.

by which the test pressure is applied. Like everything else about the place the testing is done with great celerity—a minute or so sufficing to place a pipe in position, test it and pass it on for its successor. Water-tight joints are made at the ends by thick gaskets of hard wood, which are interposed between the face-plates and the pipe ends. There is no preparation of the pipe ends, the rough surfaces being forced into the wood gaskets with sufficient force to make tight joints without difficulty.

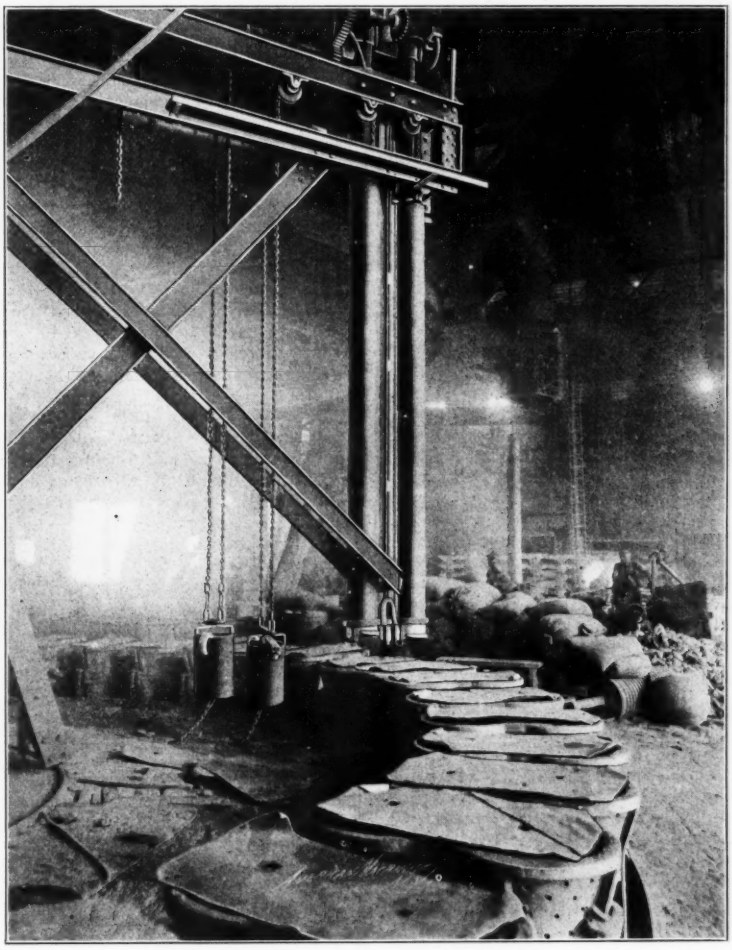
The methods employed at the Chattanooga plant of the United States Cast Iron Pipe & Foundry Company are found in no other and are due to Mr. D. Giles, who has been connected with it for many years. There is here no pit, but in its place a turntable on which the flasks are mounted before ramming, and from which they are not removed until after pouring. With this central idea goes

wheel, not shown, the stop being made in all cases with the molds located directly over openings in the top of the furnace. Perforated plates to hold back the heat are placed over them as shown in Figure 2.

The iron frame shown in Figure 1 is swiveled at the center of the turntable and might at first glance be taken for a jib crane. It is not such, however, but a frame for carrying one of the most novel features of this foundry —the mechanical rammer for the molds. This device is shown more fully in Figure 2 in which, in order to photograph it, the rammer has been swung away from the molding portion of the turntable to the drying portion.

The rammer, which is double, to adapt it to the double flasks, consists of a pair of tubes with thickened, screw-shaped ends. The tubes are driven by square shafts running down through them, and are counterweighted by the

balance weights shown near them—the counterweights having removable portions which, when removed, leave an excess of weight in the tubes. When a pair of molds is to be rammed the patterns are inserted and the rammers are run down over them. Sand is then shoveled in around the tubes and they are set in motion by an electric motor which drives them from above through the square shafts. The action of the screw-shaped ends is to compress the sand and to screw the rammers upward, this action continuing as sand is added until in a surprisingly short space of time the mold is finished.



NO. 2. THE MECHANICAL RAMMER.

The crane system is not well shown in these views, because of the inevitable smoke which is always present. The jib form of crane is entirely abandoned, and in its stead is a series of cranes which may be described as swinging travelers, one end of each crane girder being hung from the roof on a swivel, while the other travels on a semi-circular suspended track. Each turntable has two such cranes, one for placing the empty flasks in position on the turntable and for removing the poured molds therefrom, and the other for dropping the cores into the molds and for handling the ladle, as it is doing in Figure 1. The circular track of the former crane is seen suspended from the roof at the left in Figure 1, and the girder of the latter may be identified by tracing the chain from the ladle. The swivel of the former is located at the left side of the building, over the door through which the pipe is discharged, while the swivel of the latter is over the center of the turntable, where also is the operator's cage. The circular track sweeps from this point as a center to nearly the right side of the building, along which is a straight trolley track by which the ladles are brought from the cupolas and delivered to whichever turntable may need them.

The cores are built up of loam, which is applied to core barrels by means of lathes, a thickness of hay-rope being first wrapped around the barrels in the shape of a double thread screw. Over this the workman applies loam with his hands, the surplus being scraped off by a straight edge. The loam is applied in two coats—a roughing and a finishing coat, with a drying between. After the second coat is applied, the core is blackened in the same lathe and the core is again dried in a core oven. The core-making is as active a process as all the others about the works. I timed the making of several 8-inch cores, and the time of the roughing operation did not

exceed two minutes, while the finishing operation, including blackening, was scarcely as long.

The facilities for handling the cores are, of course, complete. A buggy stands on one of the tracks alongside the lathe, and counterweighted ropes provide for transferring the cores from lathe and buggy and from buggy to lathe in a twinkling.

The making of the hay rope is an interesting operation. The hay is twisted into a rough rope by skillful operators, an epicyclic train of gears engaging the completed rope and winding it into a bale on the drum of a windlass. A brake controlled by the operator's foot determines the speed of the winding. The machine runs at a high rate of speed, and the operator's thoughts have no time to go wool-gathering.

Some Features of the Heating and Ventilating System in the Bellevue-Stratford Hotel, Philadelphia.*

By William G. Snow.

Certain features or details of the heating and ventilating system installed in the Bellevue-Stratford Hotel, in Philadelphia, are, it is hoped, of sufficient interest to warrant the presentation of this paper.

The building itself is of considerable magnitude, having a frontage of about 185 feet, a depth of approximately 183 feet, and containing eighteen floors besides basement and sub-basement.

When the extension is built to its full height the building will contain 827 bedrooms, 566 bathrooms, and the total cubic contents of the twenty floors will exceed 6,000,000 cubic feet.

There will be in round numbers 67,000 square feet of cast iron direct radiation and 14,000 lineal feet of 1-inch pipe in heaters.

Five 300-horsepower water tube boilers equipped with automatic stokers furnish steam at about 125 pounds pressure to a 12-inch loop extending across the boiler fronts and around the engine room, as shown in Fig. 1. Two valves were placed in each boiler connection. Standard pipe and extra heavy flanged fittings were installed. An extra heavy ribbed by-pass gate valve was inserted between branch connections to boilers, engines or pumps, these branches being connected at the top of crosses, the bottom outlet having a drip leading to a steam loop system for returning the high pressure drips to the boilers without the use of pumps or traps.

By means of the above described arrangement of valves and piping any unit can be temporarily cut out without interfering with the operation of other parts of the system.

The exhaust steam used for heating is first passed through a combined muffler tank and separator with by-pass, and is discharged through an 18-inch riser. Owing to the great height and weight of this pipe extra heavy fittings were used at the bottom to safely support the load. The back pressure valve located just below the exhaust head is fitted with a by-pass to provide for overhauling it without shutting down the plant.

When possible all apparatus was installed in duplicate, each piece being large enough for the entire system.

Live steam, when necessary, is admitted to the exhaust main supplying the heating system through two reducing valves set tandem, one of high pressure pattern and the other of vacuum pressure pattern, so called, having an outlet about twice the diameter of the inlet.

It was considered better practice to reduce the pressure from that in the boilers to that in the heating system by two stages, rather than reduce it in one operation from about 125 pounds to a pressure of a pound or less. A better control is thereby secured and the valves will wear longer.

In arranging the distributing system it was considered advisable to feed all floors above the first on the down-feed system and all floors below that on the up-feed system. This arrangement permitted the use of small pipes through the lower floors, on which, in buildings of this character, the rooms and windows are large, leaving but few partitions or wall spaces in which pipes may be concealed.

Much of the expansion of the risers is taken up in the attic, where all branches to risers are arranged with properly placed nipples and elbows to provide swing joints.

The risers are anchored at two points and contain two expansion joints of the type illustrated on page 28. Ample space was provided in which to conceal these joints, owing to the fact that in this building the distance from ceiling to floor in each case is about two feet, the ceiling being suspended some distance below the fireproof floors. In the case of only one riser was it necessary to use expansion joints of the packed type. Access to the joints on this line is provided through doors. There was no difficulty in concealing the risers, as space was provided in the building construction between the inner and outer walls.

Care was taken in making radiator connections to provide for expansion by means of a sufficient number of nipples and elbows, so arranged that no strain would come on the fittings.

In nearly all cases it was possible to set the radiators below the window sills. The top of the mahogany enclosure was made to lift on hinges; the front, running in grooves, can be lifted out.

All woodwork in connection with these enclosures was protected with asbestos air cell covering ½-inch thick covered with galvanized iron, screwed on. Asbestos covering was nailed to the brick work at the back of these enclosures and a hard coating of plaster applied to make a smooth finish.

The inlet to each radiator was through a register face of mouse-proof pattern proportioned on the basis of 2½ square inches of net area per square foot of radiation. The outlets in the top of the enclosures were of plain lattice pattern based on an area of 3 square inches per square foot of radiation.

All radiation was worked out on a wall and glass basis, due allowance being made for the cubic contents. This method gave ratios of about 1 to 50, 60 and 70, respectively, for rooms on the north, east and south. Northwest corner rooms figured about 1:35, northeast rooms 1:40, and bathrooms about 1:30 to 1:35. In large rooms like the main dining-room, located at the southeast corner of the building and containing approximately 95,000 cubic feet, the ratio is 1:82 for concealed direct radiation. In this room, which is 20 feet in the clear, the glass is 45 per cent of the total exposure. The windows are double.

In the Palm Garden, exposed toward the west and containing 77,000 cubic feet, direct-indirect radiators are

*Paper read at the twelfth annual meeting of the American Society of Heating and Ventilating Engineers, held in New York City, January 16-18, 1906.

used, connected with the blower system. Here a ratio of 1:148 gives satisfactory results, the ratio of glass surface to exposure being about the same as in the main dining-room. The ratios throughout were used merely as a rough check on the amount of radiation computed on the basis stated above.

Owing to the fact that the direct radiators were concealed it was assumed that they would give off only 175 heat units in place of the usual allowance of 250 heat units per square foot per hour.

On the lower floors, up to the sixth, two sets of double hung windows are used to shut out noise and dust; this permitted the use of a smaller amount of radiation than usual in proportion to the contents, the transmission loss through these windows being taken as three-fifths the amount through single windows.

perature of the air supplied was controlled in a similar manner by cold air and warm air thermostats placed in the ducts controlling diaphragm valves on the heaters. A supplementary heater connected with the buffet was independently controlled by a thermostat placed in the room. Thermostats were used of a type that cannot be tampered with without unscrewing the face.

The heating of the principal rooms was treated independently from the ventilation, with the exception of the buffet in the basement.

The greater portion of this room is below the street level. The exposure is so small that it was deemed better to heat it by means of a supplementary coil placed in the sub-basement designed to reheat the air supply than to heat the room by direct radiation. This method of heating the buffet was the simplest and least expensive, a re-

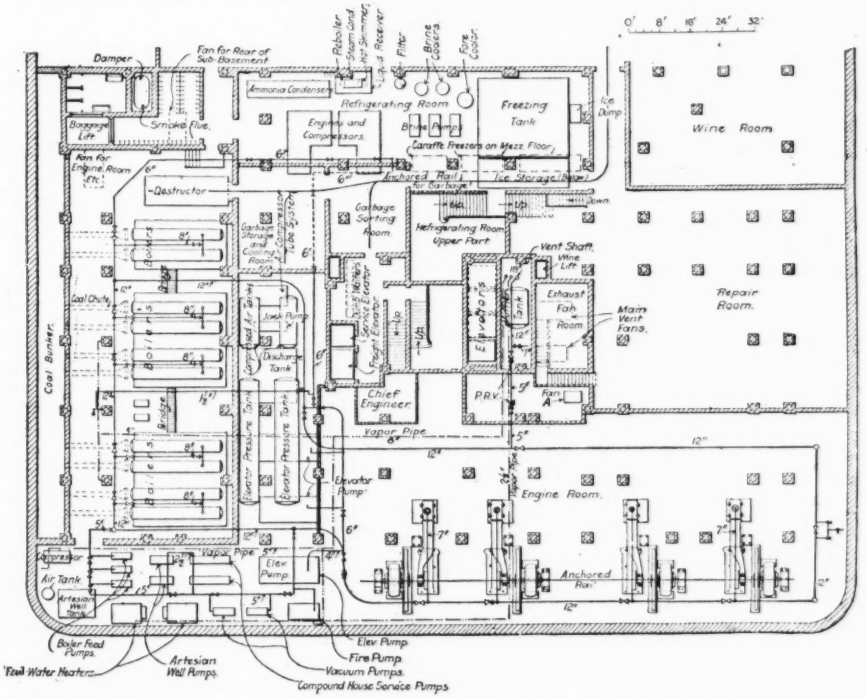


FIG. 1.

To permit the control of room temperatures by guests to suit their wishes, a long stem supply valve was used on each radiator, the wheel coming just outside of the enclosure. A special valve used in connection with a vacuum return line system was placed at the return end of each radiator.

At the entrance to the building Van Kannell revolving doors are used, over which coils are placed, admitting cold air from the street and discharging it through openings overhead, thus introducing large volumes of hot air where most needed.

While it would have been preferable to introduce the heat near the floor at these points, it was impossible to secure suitable radiator locations owing to the decorations or to the arrangement of furniture.

By installing a sufficient amount of surface in the mannner described, it has been possible to keep the corridors perfectly comfortable.

Thermostatic control was applied in the principal rooms controlling diaphragm valves on the radiators. The tem-

heater of 300 square feet of surface serving to heat the room containing 82,000 cubic feet.

In the café and some other important rooms the fresh air is admitted through flue radiators placed under the windows, this arrangement giving a better distribution of air than could be secured with flues located in the only spaces available.

In the main and private dining-rooms the heating is done entirely by direct radiation, the air being supplied at 70 degrees temperature through openings in the walls about 10 or 12 feet from the floor.

The rooms on the main and first floors are approximately 20 feet and 17 feet in the clear respectively, the fresh air inlets being located a little higher than usual to suit the decorations.

In the ventilation of rooms, the outlets are located near the floor, except in rooms where smoking takes place. In these they are placed in the ceiling, the openings being concealed by rosettes or stucco work incorporated in the

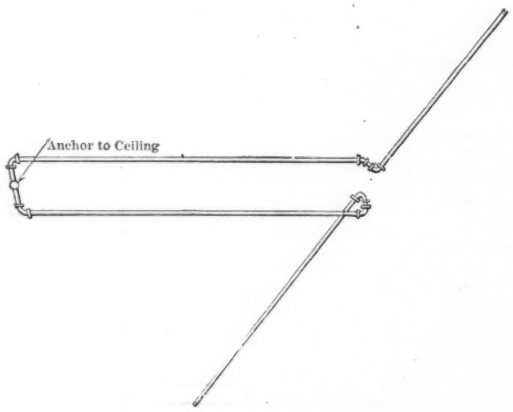
scheme of decoration, making a very effective system and avoiding the use of wall registers.

The air supply in such rooms is, as a rule, brought in through flue radiators located below windows, this system of upward ventilation removing smoke at once from the breathing plane.

In most cases the galvanized iron air supply and vent ducts were placed above corridor ceilings, the sizes being based on velocities of 700 and 600 feet per minute, respectively, with somewhat lower velocities at the extreme ends.

Register sizes were based on a velocity of approximately 400 feet per minute through them.

The change of air in buffet, café and rooms where smoking takes place is approximately once in ten minutes. The air change in the main dining-room is once in fifteen minutes.



In certain rooms used sometimes for banquets and at other times for readings and entertainments, top and bottom ventilating openings were provided so that the air can be withdrawn from near the ceiling or the floor, as desired.

A departure from the common practice of locating fans in the basement was made in this building, in which the main supply fans are located in the attic.

Reasons which led to this choice were lack of suitable space in the basement or sub-basement for the air supply fans and the fact that, by locating them at the top of the shafts instead of at the bottom, branch supply ducts could be taken from the main shafts, which are gradually reduced in size, making them smallest on the lower floors where space is most valuable. The separate set of up-discharge flues necessary when supply fans are located in the basement is avoided.

The air is taken from points just above roof and passed through ordinary cheesecloth filtering screens. Except for particles of soot the air at this high level is practically free from dust. These fans, which are 7 feet in diameter, are driven by direct connected 25-horsepower motors at a speed of 220 revolutions per minute, corresponding to ¾-ounce pressure per square inch over an area within their capacity, forcing the air down vertical shafts a distance of over 250 feet to the rooms on the lower floors. These shafts were carefully plastered on the inside with Portland cement smoothly finished, making them as nearly air-tight as possible, because with the great length the leakage would be considerable unless carefully guarded against. The air was tempered by steam coils before passing through the fans.

It was found during the most severe winter weather that no trouble was experienced in forcing an adequate volume of tempered air down the shafts, although, had it been possible to so arrange the system, the tempering coils would have been placed at the foot of the shafts instead of in the attic, thus permitting the forcing of cold air down these flues, which could have been done with much less resistance than in the case of warm air. These fans delivered in winter weather approximately 70 per cent as much air as they would be rated to do when connected with an ordinary system of horizontal ducts.

While an air supply secured by fans located in the attic or on the roof is not uncommon with low buildings, I am not aware that it has been successfully applied elsewhere in buildings as high as the one described.

To prevent the transmission of sound the fans and attached motors were mounted on compressed cork 1½ inches thick, with the result that no trouble from noise was experienced in the sleeping rooms on the floor below them.

A separate fan delivering cold air to the boiler and engine room was installed, discharging through ducts with branch outlets turned down to blow directly toward the floor.

The removal of air from these rooms takes place through the boilers themselves and through the main ventilating fans.

The kitchen has its separate air supply designed to furnish tempered air forced down through outlets placed at intervals around the range, the exhaust ventilation from the range hood taking place through a steel plate flue carried independently to the roof, a steam jet being introduced to provide for extinguishing fires which occasionally occur in this flue.

The general ventilation of the kitchen is accomplished by main exhaust fans in the sub-basement and by ducts leading to the space around the steel plate smokestack. No air is supplied other than that around the range, it being desired to maintain a slight vacuum condition in this room so that all leakage through doors and openings will be inward.

The exhaust ventilation of the principal rooms is effected by two 7-foot fans driven by direct-connected 20-horsepower motors run at a speed of 220 revolutions per minute located in a room in the sub-basement.

Ducts lead from this suction chamber to rooms in the basement and on the main and first floors, some of the air being drawn down a vertical distance of about 75 feet, besides traveling a distance horizontally of 240 feet.

The public toilet-room is connected with a seperate ventilating fan of the blower type.

Fireplaces, of which there are 297 throughout the building, are connected with three 90-inch fans located in the attic. They are designed to run at a speed of 320 revolutions per minute and are driven by 7½-horsepower direct-connected motors.

All water closets in bathrooms have a 2-inch local vent connected with pipes leading to 70-inch exhaust fans of the blower type placed in the attic. Three of these fans are used to remove the air from 566 bathrooms. They are run at a higher speed than any others in the building, owing to the small size and great length of the pipes connected with them. They are driven by 6-horsepower direct-connected motors at a speed of 470 revolutions per minute.

The ballroom, containing about 250,000 cubic feet, is heated by direct radiation and has a separate system of ventilation, so that it can be used independently of any other part of the building.

Two 90-inch fans were provided, to be located in the attic with tempering coils for forcing down the supply of fresh air to registers located around three walls of the room below the balcony. It was impossible to introduce

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flues on the exposed side of the room, owing to space taken by windows.

Ventilation takes place through ceiling openings connected with an extensive system of ducts leading to two 4-foot exhaust fans of the propeller type, driven by direct-connected electric motors.

The ballroom system was designed to change the air once in ten minutes.

The heating of the water supply is an important item in a building of the size and character of the Bellevue-Stratford Hotel, and comes under the general title of this paper. Two 1,000-gallon hot water generators were used, the cold water supply to these first passing through coils in the drip tanks.

Either exhaust or live steam can be used in these generators, two thermostats being supplied to control the admission of steam. The one for live steam is set at a little lower temperature than the one for exhaust, so that in case the supply of exhaust steam is insufficient to give the desired temperature, live steam is supplied at a reduced pressure of 15 pounds.

When steam at this pressure is admitted, it closes a swing check valve on the exhaust steam supply line until the temperature of the water rises to a point where live steam is no longer needed.

These generators are located some distance above the feed water heaters to which the drips are trapped.

WISCONSIN MASTER PLUMBERS MEET IN MILWAUKEE.

The thirteenth annual convention of the Wisconsin Master Plumbers' Association was held in the convention hall of the St. Charles Hotel, Milwaukee, Wis., January 16 and 17, the attendance being remarkably large, even for Wisconsin, where largely attended conventions are the rule. The business of the convention was for the most part transacted behind closed doors, being almost exclusively of an executive nature, which called for the disbarment of outsiders.

The convention was called to order by President S. V. Hanley on Tuesday morning and John R. Williams, president of the Milwaukee local association, made the address of welcome, in which he extended the courtesies of the Milwaukee association to the visiting delegates. Acknowledgment of these courtesies was made by President Halsey on behalf of the State organization. National Director Halsey then introduced Acting Mayor Corcoran, who, in a stirring address welcomed the delegates to Milwaukee, dwelling on its advantages as a convention city and assuring them of a hearty and generous welcome.

Committees Appointed.

The social proprieties having been duly observed, the convention quickly got down to business and President Hanley announced the following committees:

Credentials—David Polacheck, of Milwaukee; William Meltzer, of Madison, and J. L. Lapitz, of LaCrosse.

Auditing—Louis Sonntag, of Sheboygan; George Reeke, of Green Bay, and Hugo Lippert, of Milwaukee.

Resolutions—P. H. Ryan, of Appleton; W. H. Halsey, of Milwaukee, and F. E. Green, of Janesville.

Grievances and Complaints—Jacob Schuh, of Milwaukee, chairman; C. H. Goodman, of Kenosha; J. D. Van Hovenberg, of Eau Claire; Hy. Raymond, of Racine, and Fernando W. Pripps, of Milwaukee.

The last named committee was appointed in accordance with a motion to do away with the long discussion of grievances, etc., on the floor of the convention by having these matters first considered by a representative committee. The plan is said to have worked out admirably and to have saved many hours of tedious and more or less fruitless discussion on trivial matters.

Association Flourishing.

The reports of the president, S. V. Hanley, and the secretary, P. J. Murphy, were received and considered by the convention on Tuesday afternoon. These reports show a very satisfactory growth, both numerically and financially, the net gain in members being 27, while a comfortable little sum had been added to the balance in the treasury from the year before. Three new members were initiated during the convention amid great enthusiasm.

By-Laws Ratified.

An important feature of Tuesday afternoon's meeting was the ratification of the by-laws under which the association recently was incorporated. The charter of incorporation was given a prominent place near the president's chair and seemed to be a source of interest and gratification to all. It is at least significant as indicating the growing tendency of the trade to have all things done decently and in order. The incorporation of the association, while it establishes no new rights, gives to the members and others a sense of responsibility and a certain pride in the conviction that the association is a recognized business organization.

Handsomely engraved certificates of membership have been presented to all members in good standing and will hereafter be found framed in most of the plumbing shops holding membership in the asosciation. The wearing of the official button was also urged upon the members.

Visit Trade School.

On Tuesday evening the majority of the out-of-town delegates visited the trade school recently established in Milwaukee under the auspices of the Merchants' and Manufacturers' Association. Here forty plumbers' apprentices are enrolled learning the theory of their profession after a hard day of work at the trade. A great deal of interest has been manifested in the project of the new trade school and the visiting members were eloquent in their praise of what they heard and saw on their visit to the institution.

President Boyd in Attendance.

The arrival of President C. J. Boyd, of the National Association, on Wednesday morning, was the occasion for another display of kindly good feeling all around, Mr. Boyd being introduced by National Director Halsey and being accorded hearty and continuous applause.

Mr. Boyd in his opening speech confined himself largely to a review of the encouraging growth of the association in the period during which he has held office. He brought out the fact that the association is enjoying a satisfactory, if not startling, growth in membership, the official roll showing a net gain of 244 since the Atlanta convention. It should be remembered in this connection that many members have been dropped for temporary delinquency who will probably find their way back into the fold in the near future, so that the actual gain is considerably larger than the figures would indicate.

The States which have made a net gain up to date of 10 are as follows: California, 30; Colorado, 14; Connecticut, 34; Georgia, 11; Wisconsin, 27; Illinois, 32; Louisiana, 16; Maryland, 16; New Jersey, 55; New York, 12.

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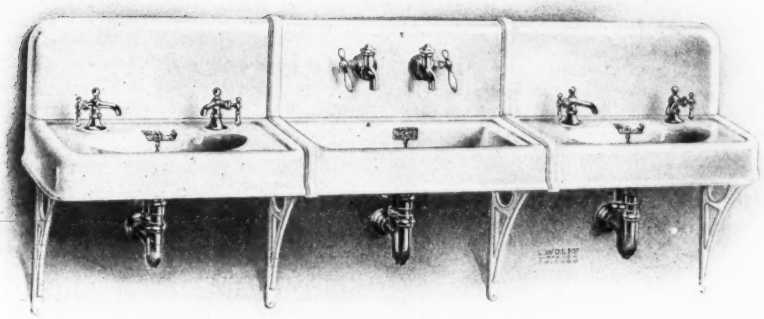

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Mr. Boyd reviewed the situation in the plumbing field as it appears to him, bringing to light certain trade abuses which are certainly in need of correction, but on the whole offering much encouragement to believe that the movement for trade betterment will go forward to still greater success.

Conferences held Wednesday morning and afternoon were almost entirely of an executive nature and the press was not admitted.

Hard Times Ahead for the Lead Pipe Thieves.

A resolution introduced by I. Toussaint, financial secretary of the Milwaukee association, met with hearty endorsement. The resolution called attention to the fact that as the law now reads hoodlums and professional thieves who enter empty buildings and houses in process of construction and tear out the lead pipe and brass fittings receive punishment, if at all, altogether disproportionate to the damage done. As the actual value of the material taken often falls below $25, these sneak thieves if caught escape on a light sentence for petty larceny. If this type of thievery were recognized by the law as burglary, or the actual damage done be included so as to make the charge one of grand larceny, then criminals would hesitate to take up this profitable, if dastardly, form of stealing. The matter was referred to the incoming executive committee with instructions to endeavor to secure the necessary legislation.

Election of Officers.

Under the requirements of the charter recently granted to the State Association it was necessary that the convention first choose by ballot a board of directors composed of five members, from which number, on a subsequent ballot, the executive officers of the association were chosen.

This made the balloting long drawn out and a trifle tedious. At no stage of the game, however, was there any doubt of the choice of delegates for officers for the year 1906, and the candidates finally elected represent the practically unanimous choice of the convention. They are:

President—JACOB SCHUH, Milwaukee.

Secretary—P. H. MURPHY, Milwaukee.

Vice-President—GEORGE REEKE, Green Bay.

Treasurer—GEORGE KRAFT, Madison.

Delegates to National Convention—Charles Belz, Milwaukee; W. J. Meltzer, Madison.

Alternates—P. H. Ryan, Appleton; O. C. Davis, Racine.

The Banquet.

The twelfth annual banquet, held in the ordinary of the St. Charles on Wednesday evening, was preceded by an informal reception held on the parlor floor, the local and visiting members and their ladies spending a pleasant hour in the renewal of acquaintanceship.

The menu, which was served on attractively decorated tables, was enjoyed by 269 guests, this being the social event of the year in Wisconsin plumbing circles.

Nearly every member was accompanied by wife, sister or sweetheart, this being a happy custom in the Badger State.

While the menu was being served a ladies' orchestra, led by Miss Murphy, daughter of Secretary Murphy, discoursed sweet music in a very acceptable manner.

Vocal selections were rendered by Mr. J. Halsey, by Miss Greenwood and by Master Hibbard, a phenomenal soprano, repeated encores being insistently demanded after each number. Too great praise can hardly be expressed of this most enjoyable feature of an exceptionally enjoyable evening.

Toastmaster Murphy, with the coming of the after-dinner coffee, introduced National President C. J. Boyd, who spoke briefly of the aims and objects of the association, taking for his text that portion of the constitution which provides that steps shall be taken for "the advancement of sanitary laws and the better enforcement thereof, and for the improvement of plumbing appliances as a means of promoting better sanitary conditions."

Wonderful progress had been made since the organization of the asosciation, Mr. Boyd said, in the practice of plumbing and the necessity of sanitary surroundings was now pretty generally recognized. In all this progress the plumber had taken an active and influential, if oftentimes an unappreciated, part. Mr. Boyd closed with an earnest appeal for more stringent plumbing laws, the examination and licensing of all plumbers, and a broader appreciation of the importance of the work of the plumber.

National Director W. H. Halsey, as chairman of the entertainment committee, thanked the guests for their attendance and spoke briefly and to the point on matters of interest to the members.

William E. Goodman extended a fatherly wish for good success and good health to all for the coming year.

S. V. Hanley briefly reviewed the history of the State Association from its organization to the present day, making an eloquent plea that all should "pull together toward Port Union. That the plumber had not had his fair share of the material gain which had come through the wonderful demand for plumbing was due to no other cause than that the plumbers had failed to work together in unity to secure their rightful heritage.

Mrs. A. R. Schwind, Mrs. W. H. Halsey and Mrs. S. V. Hanley responded to the toast "The Ladies," and acquitted themselves in a manner which called forth generous applause.

George Reeke, newly-elected vice-president, and John R. Williams, president of the Milwaukee local, took as their theme the education of the apprentice, with particular reference to the Milwaukee School of Trades, mentioned elsewhere in this edition. The subject proved a timely one and was well received.

Isaac Toussaint recited a dialect poem with the healthy moral, "Don't want to find oud too much dings dot isn't of your own."

Jacob Schuh, president-elect of the State Association, though disclaiming experience as an after-dinner speaker, confirmed the good opinion in which he was already held by a speech full of earnest dignity.

Set 'Em Up in the Other Alley!

As usual, the bowling game occupied a good share of the time between the business sessions, there being many ardent devotees of this sport among the master plumbers. A match game was played off Tuesday evening, the Milwaukee crack team, composed of Dusold, Goll, Polacheck, Pelunek and Stolberg, meeting all comers from up State. Teams from the Madison, Racine and Appleton Associations went down to defeat before the Milwaukee wizards, who gave the ball a peculiar twist which ultimately gave them a score of 2,690 in three games, a score which, it is said, would give them the National championship if played in open contest. The prizes were five elegantly decorated steins put up by the proprietor of Terry's alleys. The most remarkable play of the evening was that of Frank Young, of Madison, who attained an average of 209 for the evening's play. Dusold and Polacheck also made splendid scores.

Challenge.

The Milwaukee Regulars, composed of members of the Milwaukee Master Plumbers' Association, will meet any bowling team of five, made up from the membership of any other single local association, for a purse of $100 or upward. Address all answers to this challenge to

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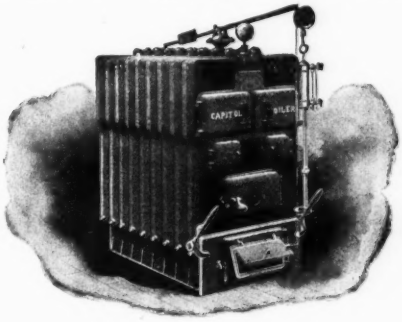

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the Bowling Editor of Domestic Engineering, 58 North Jefferson street, Chicago.

The Supply Men.

W. C. Heinrichs and Mon Whitney, of the H. Mueller Manufacturing Company, Decatur, Ill., were present and extended the glad hand to the delegates and their friends.

Alex. Buchman, sales manager of the Glauber Manufacturing Company, of Cleveland, dropped off at Milwaukee for the convention en route for Minneapolis, where he will station "Sunny Jim" Forsch, one of the hustling salesmen of the Glauber traveling staff. Charles Sampliner completed the Glauber trio.

V. J. Mahler and Charles I. Frankel, of the United Brass Manufacturing Company, of Cleveland, contributed to the joy of the occasion by presenting each delegate with a cow bell attached to a watch fob. These bells, though small, made a lusty noise when wielded with vigor by the delegates and their ladies.

The three paper-weights, "Billy" Meltzer, Walter Highlands and S. R. Church, were as inseparable as the Siamese twins. "Just because I buy you presents once in awhile," the inimitable Billy was heard on several occasions to remark to his side partners, "don't think I'm Santa Claus."

James A Trane, of LaCrosse, who has been absent from the conventions for several years past, having practically retired from the plumbing business in order to give his exclusive attention to installing heating systems, has again returned to the fold and says the plumbing field and the plumbing fraternity look better to him than ever before. Mr. Trane was a plumber many years before he took up heating work and he finds the habit harder to shake off than he had anticipated.

Venerable "Pop" Goodman, godfather to the whole plumbing fraternity, was at the heart of things, as usual, the Milwaukee plumbers having refused on his recent retirement from active participation in the trade to permit him to give up his connection with the coöperative buying concern of which he had been treasurer for nearly twenty years. He now acts both as manager and treasurer of the Milwaukee Sewer Pipe & Supply Company, thus retaining his connection with the trade he loves so well, but finding life much less strenuous than before.

TWELFTH ANNUAL MEETING OF THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS.

The twelfth annual meeting of the American Society of Heating and Ventilating Engineers was held in the Mechanical Engineers' building, in New York, on Tuesday, Wednesday and Thursday, January 16, 17 and 18. The opening session was called to order at 2:30 Tuesday afternoon by President William Kent, who said in part:

In opening the twelfth annual meeting of the Society of Heating and Ventilating Engineers it is my great pleasure to congratulate the society upon the progress it has made during the past year. The reports of the Secretary and the Board of Governors will show that the membership has increased more rapidly than in any preceding year, and the annual and semi-annual meetings have been attended by greater numbers than ever before. The society having lived and grown for twelve years, may now be said to have satisfactorily proved that it has a reason for existence and its future steady growth may safely be predicted.

I desire in this address to give expression to a few facts concerning the present status of the heating and ventilating art. During the last twelve years or since the society was founded there has been a notable advance in heating and ventilating practices, but a very trifling advance in scientific research, and still less in the reduction of the results of research to formulas, theoretical or empirical, which can conveniently be used in practice.

The advance in practice has been due to necessity. The demand for larger and more effective and more reliable apparatus springs first from the increased wealth of the country which causes the erection of larger and more costly buildings; second, from the increase of luxurious habits of the people requiring more heating and ventilating and less trouble in manipulating or regulating the apparatus; third, in the better education of the people as to the desirability of thorough ventilation. This demand has stimulated designers and manufacturers of heating and ventilating apparatus to improve their methods and their results.

So far as simple heating is concerned, the modern heating and ventilating engineer finds no difficulty in designing a system either direct or indirect, live steam or exhaust steam, or hot water, which will carry heat to any distance desired and deliver it in one or many rooms, heating them to 70 degrees or more when the outside temperature is 20 degrees below zero. Even the warm air or furnace system is capable of accomplishing the same results when reinforced by electrically driven fans, when the distance is not too great. The only limit that is fixed in heating a building or a group of buildings is the limit of cost fixed by the owner.

The problem of ventilation, however, is a much more difficult one for the designer. It is easy enough to ventilate properly a large single chamber, such as a church, a cathedral, a theater or a stock exchange, but when a large building of several rooms such as a public school, or a court house, or a hospital, or a skyscraper building, is to be ventilated, the problem becomes very complex and it cannot be said that any general solution of it has yet been found. Each case has to be studied carefully by itself in the light of previous practice and the record of such practice includes almost as many failures as successes. Many of these failures are due to the parsimony of the owners who limit the cost to a figure at which it is impossible to provide good ventilation. Others are due to the failure of the architect to call in the advice of competent experts, and still others are due to the imperfect education of the experts themselves, or to their neglect to appreciate the real difficulties of the problem on which they are engaged.

Let us consider for a moment what are the difficulties of heating and ventilating a large building containing many rooms such as a school house or a court house. The problem to be solved is to keep each room at a temperature of, say, 70 degrees Fahrenheit and the air of such purity that it contains at no time more than eight volumes of carbon dioxide in 10,000 volumes of air, or twice the amount found in the atmosphere outdoors. The mere heating of each room can be done satisfactorily by direct steam radiation with thermostatis control of the steam supply. The ventilating problem, however, is not so easily solved. Each room should have given to it a quantity of air proportional to the number of persons in the room. The means provided for supplying fresh air to the building is usually either a fan placed in the basement which pushes the air into the several rooms, the air finding its way out through the foul air exits, or else there is an exhaust fan in the attic or on the roof of the building, pulling out of the rooms the air which is admitted from the air inlet pipes. In the best modern practice the incoming air is warmed by steam coils in the basement before being allowed to enter the rooms. In some cases there is both a blower fan in the basement and an exhaust fan for foul air at the roof, but in all cases there is one main entrance to the building for receiving fresh air from outdoors and one main exit flue for the escape of foul air. Between the points of entrance and exit there are at least as many channels or pipes for the air to travel in, as there are separate rooms. The areas of these pipes add their resistances due to friction to right angle bends, dampers, etc., may be calculated and adjusted so that when there is still air outdoors and the fan or fans running at a certain speed, the air delivered into each room may possibly be the amount calculated by the designer. I say "may possibly" and not "will certainly," because it is scarcely possible to design a system of a large number of pipes varying in size, diameter and length leading from an air reservoir to another reservoir at lower pressure in which each pipe will deliver its due proportion of air. There is bound to be more or less "short circuiting" under the most favorable circumstances.

The next trouble is that if we have the pipes so perfectly designed that each pipe under the best circumstances will deliver its own calculated proportion of air, then the circumstances for which the pipes are designed are bound to vary every hour in the day. Some one of the rooms will have a crowd of people greater than was calculated, and they will remain longer in a room, polluting the air. Some one opens a window to let out the foul air and let in fresh, and immediately the whole circulating system is disarranged and thrown out of balance. If there is a wind blowing into the room it will blow back the incoming air supply and tend to increase the air supply of all the other rooms in the building. If, on the other hand, there is still air outside and the air from the heating coils enters the room under pressure, the opening of the window will establish a short circuit for this air to get outside by the window instead of going through the exhaust flues to the roof. Some air will enter the room on that account and one or more of all the other rooms of the building will be robbed of its proper supply. The room that is thus deprived of its proper supply will then become not only foul but overheated, and a window will have to be opened in it in order to cool and purify

(Continued on page 38.)

It's Said

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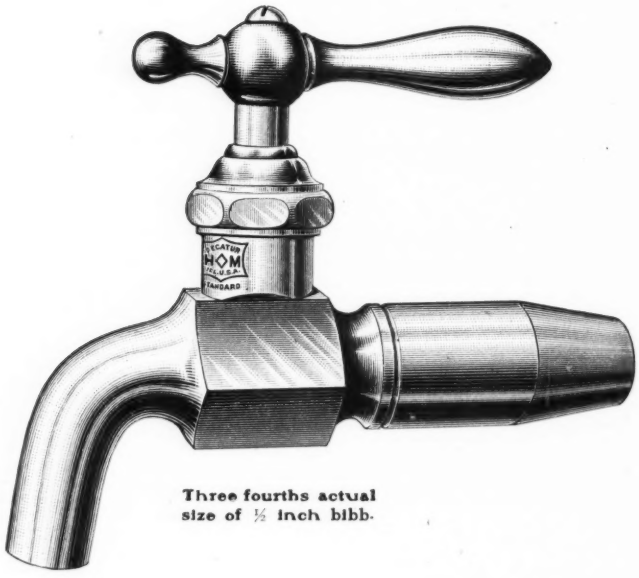

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the atmosphere, and this will further disarrange the ventilating system. What is needed is such a system as will not be put out of balance when the doors or windows are opened in any one or more rooms of the building.

We have means of automatically regulating the temperature of a room, but we have no means of automatically regulating the purity of the atmosphere in it. Not only this, we have as yet no means of even indicating the purity of the atmosphere in any convenient manner, such as we have in the thermometer for indicating its temperature and the aneroid barometer for indicating its pressure. An occupant of a room is not likely to notice that the atmosphere in room is impure until the impurity is more than double what should be allowed, and even the chemical determination of the condition of the atmosphere is a matter of no little difficulty.

Another difficulty with all methods of ventilation is that while air is so easily moved by a very light pressure in sufficient quantity to provide ventilation for any room, this pressure is apt to be overcome by the action of the wind on one side of the building entering through crevices or cracks or through the porous walls so that while the atmosphere is quiet outdoors the ventilating system may work all right, but when there is a wind pressure against the building it may be thrown out of balance.

The various complex problems of heating and ventilating are gradually being solved and the difficulties overcome by the method of trial and error. Now and then a building is erected which gives satisafctory results and the methods used in it are copied in other buildings. Again, another system is found occasionally to fail, and as the causes of failure become understood they are avoided in future designs. "Rules of thumb" are still in vogue for proportioning the sizes of every detail of heating and ventilating apparatus from the size of a grate surface and the rate of combustion of coal to the speed at which ventilating fans should be driven and the area of the pipes and registers from which they shall discharge their air. Sometimes formulas are used which are apparently based upon physical theories, but each of these formulas contains one or more empirical coefficients whose values are more or less uncertain. By the use of these formulas and rules of thumb, supplemented by practical experience, the heating and ventilating engineer is enabled, when he is not limited by cost of apparatus, to prolvide a fairly satisfactory heating and ventilating system for almost any building, but the best of such systems are not automatic; they require constant and faithful attention on the part of the operatives in charge of them and they are expensive, both in cost of apparatus and in cost of fuel. There is a vast field for research to determine more accurate values of the coefficients to be used in our formulas and to find out how it is possible to ventilate a building with just enough air to maintain the standard of purity at what it should be without discharging from the building uselessly a great quantity of hot air over and above that required for the necessary ventilation.

Why are such tests and researches not made? The answer is that all our heating and ventilating engineers are too busy to make them. We have no national laboratory of research in which they can be made and the imperfectly equipped laboratories in our technical colleges are scarcely as yet prepared to undertake such researches. We have had a committee on tests in this society for the last ten years, but it has done practically nothing, the reason always given being lack of time and lack of funds.

The literature on the subject of heating and ventilating is not yet extensive, but it is growing at a fairly rapid rate. We have but few standard text books, but we have the annual volumes of this society and of the younger British society. We have also a few trade and technical journals devoted to the subject, and the leading engineering periodicals occasionally contain valuable articles illustrating the most recent practice. A systematic and scientific digest of the literature of the last ten years is greatly needed, but the person who has both the ability and the time to make such a digest is not easily found. It might prove a good investment for one of our publishing houses to find such a man, pay him for his time, and get him to write a thorough treatise, covering both theory and practice.

The scientific study of heating and ventilation has been begun in a few of our technical colleges as a branch of the general subject of mechanical engineering, but the greatest amount of time that can be devoted to it is two or three hours a week for one-half year. An excellent description of such a course is given in the paper by Prof. J. D. Hoffman, of Purdue University, published in the 1903 volume of our proceedings. Not much practical work or research can be expected from so brief a course, but great good from it will ultimately result to the profession from its giving to a large number of engineering graduates each year an introduction to the subject and some knowledge of its fundamental principles upon which they can build later when they enter into practice. It also tends to the diffusion of knowledge on the subject among the general public and to the increase of public sentiment in favor of improvement in ventilation. It is to be hoped that before long some engineering college may find it convenient to offer a post graduate course in heating and ventilating to a few mechanical engineering graduates who shall have had a year or two of practice in the heating and ventilating business before entering upon the course.

The architectural profession is being gradually educated to the advisability, or the necessity, either of employing consulting engineers on all important work, or else of architects associating themselves with engineers as partners. The time seems to have arrived when the profession of architecture should be divided just as the engineering profession has been. We no longer have general engineers who are competent unaided to undertake the design of every detail of a plant which shall include in it matters belonging to several branches of engineering, such as civil, mechanical and electrical; we no longer have railway engineers, but engineers of maintenance of way, of motive power, and of electrical transmission and motive power. So also we should have artist architects, who could revel in designs of exteriors and interiors, and engineer architects, and these last should be divided into structural engineer architects, who would design the foundations and the superstructure, and architectural mechanical engineers who would have to do with boilers and chimneys, pumps and piping, elevators, electric lighting and heating and ventilation. The ideal arrangement, of course, would be the association of these three kinds of men in partnerships, styled "architects and engineers." It ought to be generally recognized that no good artist can be an engineer and no good engineer an artist.

The society is to be congratulated on the fact that, due to its efforts, two states, New York and Pennsylvania, during the past year have passed laws leading towards the securing of a reasonable amount of ventilation in schools hereafter to be built in these states. It is to be hoped that the society will continue its efforts in this direction, and that other states will soon follow the example set by New York and Pennsylvania.

* * * * * * * *

The society has done a great deal of good work during the last twelve years, but it is only a mere beginning. I have already hinted at some of the work that lies before us. There are other things yet to be done. Let us double our present membership in the next five years. It can easily be done. Let us encourage the young men especially to join. Ten years hence they will be the leaders of the profession. Let us have our midsummer meetings as far west of New York City as possible, to let people know that we are a national society. Let us start a "question box," following in a mild way the example of the Ohio Gas Light Association, which has just issued its third question box annual volume, a book of 900 pages, containing no less than 4,920 answers contributed by 519 contributors to 567 questions. If we could have a question box of only one-tenth this size, what a valuable thing it would be? Our Committee on Furnace Heating started a series of questions nearly a year ago, but only two replies have thus far been received. It is a rather slow beginning, but we hope for better results in the coming year. It takes time to get engineers in the habit of devoting a small portion of their valuable time to the public service without compensation, but if the Ohio Gas Light Association can get 519 different people to answer its questions on such a subject as gas, why cannot we get one-tenth of that number on the more vital subject of fresh air, a subject that is of the utmost importance to the health of the community?

Let the good work of the society go on, and we shall soon have an organization of which we may be proud, not only on account of its numbers, its resources, its professional standing among other scientific societies, but above all on account of the work it has done and is doing for the advancement of the science and the art of heating and ventilation, and for the benefit of the health of our fellow men.

Secretary William M. Mackay, then rendered the following report:

At the last annual meeting our membership was composed of 198 members, 1 honorary member, 16 associates and 5 juniors, or a total of 220 members of all grades. During the year we have added 30 members, 3 associates and 3 juniors. Four members have been dropped from the roll for non-payment of dues, 6 members and 2 associates have resigned, and James Curran, a valuable member of our society, who was elected December 9, 1901, died October 27, 1905. Our present membership is 217 members, 1 honorary member, 17 associates and 8 juniors, or a total of 243 members of all grades, making a net increase of 23 during the past year.

The financial affairs of the society are in good condition. At the last annual meeting there was a balance in the hands of the Treasurer of $684.19. We have received from all sources during the past year $2,542.75, which, with the balance on hand, made a total of $3,226.94 available. The total expenditures amounted to $2,593, leaving a balance in the hands of the Treasurer of $633.94. There is a balance owing from members for dues, etc., and from newly elected candidates for membership for initiation fees and dues, amounting to $1,150, which, with the balance on hand, amounts to $1,783.94. The principal reason for the large amount due is that the last ballot was delayed and $485 of this only became due on the 15th inst., so that the actual old balance owed by members is $655, or about the same as last year. We have no unpaid bills except those in connection with the present meeting, which have not been presented. The members dropped from the rolls during the year owed the society a total of $120. The Secretary's expenses for the year, including stenographer, clerk hire, rent of postoffice box, expenses in connection with the summer meeting, postage, expressage, etc., amount to $629.44. The 1904 Proceedings were sent to the members in December, 1905, and the 1905 Proceedings are now being edited and corrected and will be forwarded to the members as soon after this meeting as possible. The cost of the editing and printing of these Proceedings will amount to about $860. The society held a very successful meeting at Chicago, Ill., July 7 and 8, 1905, being the best attended summer meeting we have ever held. All the papers to be presented at this meeting, while received late, have been printed and forwarded to the members.

The report of the treasurer showed the society to be in good shape financially.

The board of governors reported an increase in membership and that the financial affairs of the society are in good condition, with sufficient funds on hand to pay for the publication of the 1905 volume, which has been delayed, but which will be forwarded to the members as early this year as possible.

The report of the committee on compulsory legislation showed that through their efforts with the coöperation of the members of the society advantageous laws had been passed in New York State, Pennsylvania and New Jersey, and that at this time efforts were being made to secure the passage of such laws in Michigan and Illinois.

The committee on standards reported against the adoption of a list of abbreviations as proposed at the last annual meeting, and advised against the adoption of a set of standards for steam mains at this time on account of insufficient data.

Considerable discussion of the subject was brought out, in which a prominent part was taken by Messrs. James A. Donnelly, John Gormly, H. J. Barron, Secretary Mackay and Frank K. Chew, the consensus of which was that the subject was of great importance and that a sub-committee of the committee on standards should be appointed, and other means employed to bring out data on the subject at the next summer meeting. The chair appointed Frank G. McCann, J. J. Wilson and N. P. Andrus as tellers and announced the time for depositing ballots closed.

The secretary read communications inviting the society to meet in their cities from Chicago, Milwaukee, Denver, Atlantic Sity, Columbus, Ohio, and London, England.

John S. Brennan, of Milwaukee, presented the invitation of Milwaukee in person, strongly urging the advantages of the Cream City as an ideal place for the summer meeting.

Discussion pointed to the advisability of holding the summer meetings west of Pittsburg, and thereby creating greater interest among the engineers in the western part of the country as well as giving the members from a sections the opportunity of studying the methods employed in each.

Selection of the place of meeting was deferred till a later session.

A communication was read by Secretary Mackay from the American Society of Civil Engineers, inviting the members of the society to attend their meetings and use their library. A motion was adopted authorizing the secretary to accept the invitation and return the thanks of the society for the courtesy extended.

U. G. Scollay offered the following questions, which brought out a lengthy discussion:

Why should a steam heating contractor, who is working under the plans and specifications of an expert consulting engineer, be compelled under his contract to guarantee the working of his job, or the temperature, or the delivery of a specified amount of air for the heating and ventilating of any particular room or structure?

Is it possible to make a small float for steam traps or valves that will not collapse or become water logged?

The latter question was deferred till a later session, while the former was discussed at considerable length, Messrs. Payne, of Jersey City; Rutzler, Mackay, Donnelly and Barron, of New York; Prof. Carpenter, Davis of Chicago, Thompson of Scranton, and Harvey of Detroit, leading in the discussion. The consensus of opinion prevailing that the engineer should stand back of his plans and specifications, and become responsible, rather than the contractor, though this is not the general practice.

Mr. Barron offered a resolution that it was the sense of the meeting that the engineer should assume responsibility for work designed by him, which was amended by Mr. Thompson to contain the proviso that the engineer have full power to award the contract and superintend the erection of the plant.

The meeting then adjourned to meet in the evening.

Tuesday Evening Session.

The Tuesday evening session was called to order at 8:30 by President Kent, and the election of officers announced by the tellers for the ensuing year as follows:

President—John Gormly, Philadelphia.
First Vice-President—C. J. B. Snyder, New York.
Second Vice-President—T. J. Waters, Chicago.
Secretary—William M. Mackay, New York.
Treasurer—U. G. Scollay, Brooklyn.

Board of Governors—John Gormly, Philadelphia, chairman; C. J. B. Snyder, New York, vice-chairman; T. J. Waters, Chicago; Prof. R. C. Carpenter, Ithaca, N. Y.; B. F. Sangland, New York; James Mackay, Chicago; Albert B. Franklin, Boston; Frank K. Chew, New York.

C. Teran, of New York, presented an interesting paper on the "Heating and Ventilating of the Broadway Tabernacle," in which several new features were described and which evoked considerable discussion by Messrs. Barron, Prof. Carpenter, B. H. Carpenter and others, during which the author answered many questions and explained the system employed in detail.

William G. Snow, of Boston, followed with a paper on "Some Features of the Heating and Ventilating System in the Bellevue-Stratford Hotel, Philadelphia." [See Page 26 of this issue of Domestic Engineering.]

In the discussion which followed the active participants were Messrs. Barron, Quay and Donnelly, of New York, and Gormly, of Philadelphia.

In discussing the merits of the direct connected motor driven fan as preferable over the belt driven type Messrs. Barron and Quay favored the latter type, while Mr. Snow preferred and defended the direct connected type, which is in use in the hotel.

Mr. Cory, of New York, presented an address calling attention to the fact that January 17 was the two hundredth anniversary of the birth of Benjamin Franklin, the father of heating and ventilating in this country, showing a diagram of the original Pennsylvania fireplace, invented by Franklin, and described in a book written in 1745, from which he read several extracts, showing the introduction of warmed fresh air, and that the reasoning of Dr. Franklin at that early date was correct and represented the same principles as are used in the best heating and ventilating practice today. Mr. Cory offered the suggestion that it would be of interest and a fitting memorial to the distinguished father of heating and ventilating in America to incorporate in the records of the society Dr. Franklin's observations on the heating subject.

This was put in the form of a motion by Mr. Barron, with the proviso that after securing the coöperation of the Franklin Institute of Philadelphia, Mr. Cory's suggestion be followed. The motion was seconded by Mr. Chew, who moved that Mr. Cory be given a vote of thanks for his interesting address and suggestion, which was carried.

Mr. Gormly, of Philadelphia, called attention to a news item proposing a revision of the Building Code in New York, in which the Commission was to be composed of representatives of every trade in the building line, with the exception of the heating and ventilating trade.

Mr. Wolfe offered a motion, which was amended by Mr. Quay, and which as adopted provided for the appointment of a committee of three to look into the matter and take such action as would be for the interest of the society.

Wednesday Afternoon Session.

President Kent called the meeting to order at 2:30 Wednesday afternoon. A paper on the "Arrangements for the Ventilation of the Debating Rooms of the new Riksdag Building in Stockholm, and the Results Obtained in This Respect," by William Dahlgren, of Stockholm, Sweden, was read by B. H. Carpenter, of Wilkes Barre, Pa., the author being absent.

In the discussion of the paper, led by Mr. Bolton, of New York, and participated in by Messrs. Barron and Donnelly, of New York; Wolf, of Philadelphia; Payne, of Jersey City, and B. H. Carpenter, of Wilkes Barre, Pa., it was shown that while downward ventilation was all right in theory it was harder to secure perfection than in the upward system, a great difficulty being to get the temperature at different levels even.

The report of the special committee, composed of President Kent, Frank K. Chew and C. E. Oldacre, to collect data on furnace heating, was read by Mr. Chew, answers being given by Wm. G. Snow and J. P. Bird, of Putnam, Conn.

Mr. Bolton moved that the report of the committee be accepted and a vote of thanks given the committee for their services and the committee continued, which was carried.

The first topic for discussion was: "The Increased Tax on Indirect Heating Apparatus Due to the Use of Partition Flues, Owing to Their Shape and Restricted Area." The consensus of opinion was that the round flue offered less resistance and had been found to give a better circulation of air.

Topic No. 2: "The Difference Between the Theoretical Estimate and Actual Consumption of Fuel Required for Heating Buildings" was discussed by Professor Carpenter, who stated that he had found from tests that the fuel consumption checked up very accurately with the amount required in theory.

The question, "How much water is evaporated by one pound of fuel in a house-heating boiler?" was submitted and answered by Professor Carpenter, who stated that in several tests he had found the consumption of fuel fully as economical in the house-heating boiler as in the large power boiler. That by burning four pounds of anthracite coal per square foot of grate surface per hour 70 to 75 per cent of the thermal value of the coal was used, or that nearly nine pounds of water could be evaporated by one pound of coal.

After having their pictures taken the afternoon meeting adjourned.

The Banquet.

Probably never before in the history of the society has a greater number of its distinguished members and its guests assembled than gathered in the spacious and tastefully decorated dining room of the new Grand Hotel, Thirty-first street and Broadway, on Wednesday evening for the annual banquet of the society, over 150 being present. The social feature of the banquet was greatly enhanced by the grouping of the guests at small tables, with the officers and Board of Governors occupying the head table, which was profusely decorated. The delectable menu received full justice. With the advent of the cigars President Kent, who acted as toastmaster, opened the speechmaking by calling attention to the 200th anniversary of the birth of Franklin, the originator of hot air heating, whose anniversary was celebrated to-night.

Professor Carpenter was then presented and talked on the future of heating and ventilating. He reviewed the good that had been accomplished since the inception of this society in the education and elevation of the men engaged in the art, as well as the great elevation of the art itself, in which to-day good theory and good practice was blended.

James Mackay was next introduced and asked to speak for the West as to what was thought of the society there, etc. Mr. Mackay said he thought that it would be a good thing for the society and for the West to hold the meeting in the West in the summer, where the impression had prevailed to too great an extent that the society was confined to the borders of New York state and possessed of a fancied feeling of exclusiveness that did not exist.

"The Plumber as a Heating Engineer" was the subject assigned John Traynor, of Baltimore, who spoke as the representative of the Master Plumbers' Association.

Albert B. Franklin was presented as the representative of the National Association of Masters Steam and Hot Water Fitters. He cited the establishment of the open shop in Boston, whose members sent greetings to the society, and said he believed that the time had come when it was not right or well for the engineer to withhold information, for what the country needed was education along the lines of heating and ventilation and that the more education given the greater would be the benefit to the trade and its citizens. He also thought that the engineer to-day could do nothing better than disseminate his information, especially to the younger men in the trade, and he urged upon all their great opportunity in benefiting the citizens of the country through the heating and ventilating profession.

John Gormly, the new president-elect, was then introduced. He said the fraternal spirit that had existed among the brothers of this society since its inception he considered one of the chief causes for its growth and prosperity. It had done good work, but had much more to do. He said that as the work of the refrigerating engineer was so closely allied with that of the society he thought the members of that profession should be invited to attend the meetings and become members.

"The Commercial Side of the Heating Business" was the topic assigned C. V. Kellogg, who spoke at some length on the subject, and strongly urged the engineer and contractor to work in harmony with the manufacturer in establishing a better commercial basis in the heating business.

Senator Albert E. Wray was presented with an eulogy of his good work in securing the passage of the compulsory heating and ventilating law in New York state, and responded with a humorous speech, highly appreciative of the courtesies and honor shown him by the society.

"The Twentieth Anniversary of the Society" was the toast responded to by ex-President Harvey. In looking forward eight years hence, Mr. Harvey said that at that time many who were gathered around the festive board to-night would not be with the members then, but he hoped the younger members coming into the society and assuming its direction would see to it that the same spirit of good fellowship that had always been manifest in the society during the twelve years of its history would be fostered and increased as time went on, and that in just such measure as this was done would success crown their efforts.

Mr. Thompson, of the International Correspondence School, of Scranton, was the next speaker, and he spoke at some length on the benefit to the ambitious young workman of learning the theory of his trade.

Hugh J. Barron responded to the toast, "Our History," in a manner greatly appreciated, and was followed by Mr. Chew, who responded to the toast, "The Press."

Toastmaster Kent then declared adjournment. Thus was forged another link in the chain of pleasant memories of the twelfth annual meeting of the society, one that will be remembered with pleasure by all who were so fortunate as to be participants.

(Report of proceedings of the last day of the meeting will follow in next issue.)

THE NEWS OF THE WEEK IN BRIEF.

WHOLESALE PLUMBING.

The Day-People s Manufacturing Company, of Detroit, has moved into its new plant at Second and Baltimore streets, where it has a commodious factory equipped with modern machinery.

The affairs of the unfortunate Sure Seal Trap Company, of Providence, R. I., bankrupt, will be closed by the payment of the second and final dividend on and after January 29. Information in relation to this may be obtained from Chester W. Barrows, referee in bankruptcy.

The Union Manufacturing & Supply Company, of 116-136 Scott place, Pittsburg, Pa., has occupied a large warehouse with ample railway sidings and with a frontage of seventy feet on Greenough street and east back fifty feet. The building is three stories high and gives the company superior facilities for loading and unloading merchandise.

The Simplex Manufacturing Company, of 140 Nassau street, New York, which is placing upon the market a new safety valve for range boilers, has opened a Chicago office in the Masonic Temple, which will be in charge of C. F. Oakley. This move has been decided upon by the company to better serve its patrons in the West, where its product is meeting with a generous demand from the trade.

A new company has been organized to place on the market soapstone laundry trays, sinks, etc. It is known as the Old Dominion Soap Stone Company and will be located at Esmont, Albemarle county, Virginia. A. H. Lloyd is vice-president and general manager. Mr. Lloyd is a well-known business man whose interests heretofore have been in other lines, and he is a welcome addition to the plumbing supply industry.

The Colonial Brass Company, of Cleveland, Ohio, was on January 2 adjudicated bankrupt. The first meeting of the creditors will be held in the office of Harold Remington, referee in bankruptcy, at 943-945 Society for Savings building, in Cleveland, at 10 o'clock a. m., January 26. Creditors are expected to attend this meeting, approving their claims and appointing a trustee and examining the bankrupt. This latter opportunity ought to prove interesting to some of the creditors.

M. L. Kline, for four years manager for Charles Gauld, jobber of plumbing, steam and hot water supplies in Portland, Ore., and for the past four years manager for the Gauld & Kline Company, has withdrawn from that company. Prior to his asosciation with Mr. Gauld Mr. Kline was for fifteen years prominently connected with the firm of Goldsmith & Lowenburg. Mr. Kline will take a much-needed rest and after that he expects to engage in the same line of business. Several months will be spent by him in traveling before he enters actively into business again.

Walls & Pearsall, of Philadelphia, wholesale dealers in sanitary specialties, plumbers', steam and gasfitters' supplies, with offices and show room at Ridge avenue, Eleventh and Hamilton streets, and Owen & Salter, of Twelth and Buttonwood streets, Philadelphia, manufacturers of plumbers' specialties, have combined under the trade name of Walls, Owen & Pearsall Company, R. P. Owen and J. E. Salter retiring from active interest in the business. Walter Walls will be president of the company and Robert Pearsall treasurer. The main office for conducting the enlarged business will be at Ridge avenue, Eleventh and Hamilton streets. The firm has also secured additional warehouse room at the northwest corner of Thirteenth and Noble streets. This is another evidence of the activity and enterprise which has characterized the former firm of Walls & Pearsall.

WHOLESALE HEATING.

The William H. Page Boiler Company, of Norwich, Conn., has filed certificate of its increase in capital stock from $10,000 to $100,000.

The Earl & Cook Company, of New York, has been incorporated with a capital of $25,000 to manufacture apparatus for heating and ventilating. The incorporators are: John L. Earl, of Newark, N. J.; Elwood Cook, of Verona, N. J.; Dominick E. Dempsey, Oswald J. C. Rose and Charles E. Williams, all of Geneva, N. Y.

The United States Heater Company, of Detroit, will hereafter be represented in the New England territory by Aug. W. Dodge, of Springfield, Mass. Mr. Dodge has been identified with the boiler and radiator business in New England for several years and he will not prove a stranger to the trade in that section of the country.

The Reed Mfg. Co., of Erie, Pa., has opened an office at 16 and 18 South Canal street, Chicago, which will be in charge of T. O. Raaen. Mr. Raaen has been connected with the Reed Manufacturing Company as traveling representative west of Erie as far as Denver for some time, and he is greatly pleased with the opportunities which the opening of this western office presents in more quickly supplying the trade with the Reed products. Arrangements have been made by which pick-up orders can be promptly filled.

Reuben P. Wright, president of the Reed Manufacturing Company of Erie, Pa., passed away at his home at Westfield, N. Y., on Friday, January 12, and was buried on Sunday. Mr. Wright was a man of great prominence in New York State, his great wealth and diversified interests bringing him into contact with the most representative citizens of the State. Four years ago the Reed Manufacturing Company was purchased by the Wright interests, and the late Mr. Wright was elected president, although his active work was connected with other business interests. Mr. Wright reached the advanced age of eighty-four years. His demise was caused by pneumonia, and was until his illness the very picture of a hale and hearty man. Mr. Wright's first success in life came in the period of the discovery of gold in California. He was one of the Forty-niners and acquired a competence and returned to the State of New York, where his means have always been wisely invested. He leaves a widow and three sons—Ralph Wright, who is president of the Eastman Machinery Company of Buffalo; Paul D. Wright and R. P. Wright, respectively treasurer and secretary of the Reed Manufacturing Company of Erie.

STEAM AND MILL SUPPLIES.

The ancient house of Merchant & Company, Incorporated, Philadelphia, has been succeeded by the Merchant & Evans Company.

The V. & G. Vise Company, with office at 8 Elbert street, Brooklyn, has started in the manufacture of a line of small portable pipe vises.

The Hayden Machinery Company has been incorporated under the laws of the State of Maine with a capital stock of $750,000. The incorporators are: T. C. Powell,

of Boston; A. C. Chapman, of Portland, Me.; I. W. Dyer, of Portland, Me.

The Chapman Valve Manufacturing Company, of Indian Orchard, Mass., has just awarded contracts for the construction of two new buildings, one 150x250 feet, to be used as an iron foundry, and the other 130x350 feet, to be arranged for shipping purposes.

The Duke Success Machinery Company, of Memphis, Tenn., has been incorporated by F. H. Reid, E. E. Merry, Joseph Townsend, T. L. LeMalta and J. G. Duke. The capital stock is $50,000. The new company will absorb the J. G. Duke Machine Works. F. H. Reid will be president; J. G. Duke, vice-president; E. B. Merry, treasurer; J. Townsend, secretary, and Thomas L. LeMalta, manager.

The Interstate Machinery & Supply Company, of Wilmington, N. C., has been incorporated with an authorized capital of $50,000. The company will carry a large stock of machinery and mill supplies. The officers of the company are: T. D. Love, president and treasurer; T. J. Pratt, general manager; Dr. H. E. Covington, of Cerro Gordo, N. C., vice-president, and B. W. Covington, also of Cerro Gordo, secretary.

The delegates who are planning to attend the annual meeting of the National Supply and Machinery Dealers' Association at Fortress Monroe, Va., February 15, 16 and 17, will be interested to know that a most delightful way of reaching Fortress Monroe is by the Norfolk & Washington Steamboat Company, which has daily service between Washington and Fortress Monroe. The sumptuous steamers of this line leave Washington shortly after 6 o'clock, which is a delightful time to pass down the Potomac and by the beautiful estate of Mount Vernon. The ride is entirely upon the Potomac river and Chesapeake bay, where smooth sailing is assured. The staterooms of these steamers are furnished with wide beds which are greatly superior to the average stateroom accommodations. Breakfast is served on board and the cuisine of the steamers has an excellent reputation. The regular rate from Washington to Old Point Comfort or Fortress Monroe is $3 one way and $5 for the round trip. Large staterooms with double beds are $2.50 and $3. There are staterooms containing two berths to be had at $1, $1.50 and $2. The return trip from Old Point Comfort is begun at 7 p. m. and Washington is reached at 7 in the morning. Good connections are made at Washington with all railway trains, both on the going and returning journey. Members of the association who desire to investigate this method of reaching the convention should write to W. H. Callahan, general passenger agent of the Washington & Norfolk Steamboat Company, Washington, D. C., for their beautiful booklet, which gives many illustrations of points of interest in Washington and en route and full particulars in relation to the sailings, connections, etc.

ASSOCIATION NEWS.

The Master Plumbers' Association, of Atlanta, Ga., on Tuesday evening, January 9, elected the following officers for the ensuing year: R. F. O'Shields, president; O. Wingate, vice-president; A. T. Bellingrath, secretary, and W. M. Loftis, treasurer. After adjournment the newly-elected officers invited the fraternity to a banquet at Durand's.

The Master Copperworkers' Association of the United States will hold its next meeting at the Hotel Kernan, Baltimore, on Thursday, January 25. The meeting will be called to order at 10 o'clock a. m., according to the call sent out by Secretary Frank S. Hanley, of 258 Broadway, New York. Mr. Hanley states that the indications point to a rapid increase in membership and interest in the association. Among the subjects on the program for consideration at the next meeting are the open versus the closed shop and the furthering of reciprocal trade relations between manufacturers of sheet copper and the members of the association.

The Master Plumbers' Association, of Washington, D. C., at a meeting in the Small building on Fourteenth and G streets, on Wednesday, January 14, elected the following officers and committees for the ensuing year: President, William Conradis; first vice-president, P. C. Schafer; second vice-president, William Cook; treasurer, Edward J. Hannan; secretary, J. C. Darnall; sergeant-at-arms, Charles E. Barrick; conference committee, William Conradis, Joseph R. Quinter, P. C. Schafer, M. J. McCarthy and Charles E. Barrick; delegate to the Employers' Association, Edward J. Hannan, William J. Hutchinson, William Conradis.

CHICAGO.

Frank Kouba, a gaugefitter in the employ of the National Steam Specialty Company, Chicago, shot and killed his sweetheart, Annie Kuzeck, and then committed suicide in a Halsted street hotel on Wednesday of this week as a result of despondency caused by parental opposition to their marriage. Kouba was 20 years of age and the young woman only 18.

The birthday of C. C. Breyer, prominent West Side plumber, was fittingly celebrated on Saturday evening last by a surprise party given in his honor by friends in the trade, Colonel Fred J. Wagner being commander-in-chief of the merry party which descended unexpectedly upon the genial Charlie and proceeded to celebrate the happy event with all due merriment. About fifty couples were invited and, needless to say, all had a splendid time.

The agreement, signed this week by representatives of the Chicago Master Steamfitters' Association and of the Steamfitters' Protective Association assures a continuance of peace for the next three years, or until the expiration of the agreement on April 1, 1909. A slight raise, amounting to 12½ cents per day, was accorded the journeymen, who in turn ratified certain shop rules submitted by the master fitters. The peaceful settlement of terms in advance of the expiration of the old agreement sets an example of sweet reasonableness on the part of the steamfitters which it is to be hoped the other branches of the building trades will strive to emulate.

The pipe testing section of the new Chicago plumbing ordinance is still held in abeyance pending the action of the Building Committee of the City Council, which has the matter under consideration. At a meeting of the committee on Monday afternoon the chairman reported that no test had been made as yet owing to the fact that the committee had been unable to find any building in the process of construction which seemed suited to the requirements. He proposed that a run of pipe be connected up above ground under conditions as nearly normal as possible and that tests be made in the presence of the committee. It was agreed that this should be done with the understanding that the tests should be made before the next meeting of the committee.

MIDDLE STATES.

Frank G. Hoffman & Son is the style of a new plumbing shop at Lowell, Mich.

Carey Bullock has purchased H. K. Flowers' plumbing business at Beverly, Ohio.

M. J. Gibbons, of Dayton, Ohio, has secured the contract for plumbing the $500,000 office building of the National Cash Register Company in that city.

George F. Dillon, a plumber of Marion, Ohio, has filed a petition in bankruptcy in the United States District Court. His liabilities are scheduled at $809.66, and he has no assets.

Sproul & McGurrin, of Grand Rapids, Mich., have been awarded the contract for plumbing and heating the new postoffice building at Battle Creek, Mich. The consideration is $2,285.

The Avery-Thoman Plumbing Company, of Jackson, Mich., has been incorporated with a capital of $6,000. The incorporators are: Frank G. Leadley, Fred J. Thoman and Frederick Thoman.

The Master Plumbers' Association, of Cleveland, Ohio, at its meeting on Tuesday evening, January 9, presented J. J. Comerford, its retiring president, with a handsome watch fob as a token of esteem and appreciation of his services during the past year. The fob was a lion's head with a handsome diamond setting. David Roberts made the presentation, and spoke very highly of Mr. Comerford and his work for the association.

The plumbing firm of Weatherly & Pulte, which has been in business at Grand Rapids, Mich., since 1878, will be dissolved by mutual consent within the next few weeks. Mr. Pulte will form the firm of Frank E. Pulte & Son, his son, William J. Pulte, now in business at Billings, Mont., being associated with him, and they will conduct a plumbing and heating business in the Board of Trade building. Warren Weatherly intends to engage in a similar business but he has not yet decided on the location for his establishment.

FROM THE WEST.

C. H. Krause has sold his plumbing business and stock on Second street, Rio Vista, Cal., to L. P. Seip.

The Des Moines Plumbing & Heating Company, of Des Moines, Iowa, has just finished the contract for the plumbing and heating in the Knoxville Inebriate Asylum. About $4,000 worth of plumbing and heating goods was installed in this job.

Journeymen plumbers at Tulsa, I. T., went out on a strike on Friday morning, January 12. All the shops, with but one exception, and 100 men are involved in the strike. They ask for an increase in wages and the number of helpers restricted to one in every shop.

Ed Walther, formerly president of the Walther Plumbing & Heating Company, of Washington, Iowa, and later president and general manager of the Walther Lighting & Heating Company, of Davenport, Iowa, has sold his stock and interest in the latter company and will soon locate at DeSoto, Mo., where he will engage in the banking business. Mr. Walther has accumulated a snug fortune and he and his brother will now purchase the bank which their father organized forty years ago.

William Gow, president of the Master Plumbers' Association of Dubuque, Iowa, has the sympathy of his many friends in the trade on account of the demise of Mrs. Gow, which occurred at their home in that city on Tuesday, January 9. Mrs. Gow was very popular in Dubuque and her untimely passing—she was only in her thirty-eighth year—came as a shock to her many friends. She is survived by her husband and three daughters. Mr. Gow is the junior member of the plumbing firm of McDermott & Gow and he is an ex-president of the Iowa State Association of Master Plumbers.

BOSTON.

Bresnahan Brothers have secured the plumbing contract for the new Boston Herald building now in course of erection on Avery street.

David Craig is plumbing the Ivanhoe apartments in Allston, a large apartment house that is to be fitted up in the most elaborate style to suit the higher classes.

John P. Drury, of 99 Endicott street, Boston, has sent out a notice to the members of the Massachusetts State Association of Master Plumbers announcing that the mid-winter meeting of the association will be held at the Highland Hotel, Springfield, on Wednesday, January 24. The call states that much important business will come up for consideration at this meeting, which every member is urged to attend, also that a large attendance at the meeting will be a source of great encouragement to the members of the Springfield local association, who have been greatly beset during the past few months but who have emerged from their difficulties triumphant and stronger than ever. A special notice accompanying the call states that on the evening of the 23d C. H. Cronin, vice-president of the association, will lead a bowling team composed of Boston members who will meet the team

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DAY METALLIC MFG. COMPANY

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DETROIT, MICHIGAN

from the Lowell association on the alleys in Springfield, and that any member wishing to accompany the party can do so by notifying Mr. Cronin, who has arranged for special transportation and who will be pleased to furnish full particulars.

NEW YORK.

The games of the Plumbing and Steam Supply Bowling League at Cadieu's alleys, on Tuesday evening, January 9, brought the following results: The Lalance & Grosjean Manufacturing Company won the first game from McMann & Taylor by a score of 722 to 664. The Master Plumbers rolled up a score of 800 in the second game and defeated the Lalance & Grosjean team, whose score was 767. The Plumbers still kept up the good work in the third and won from McMann & Taylor by a score of 863 to 700. On Thursday evening, January 11, the John Simmons Company won from the Manufacturers and Salesmen by a score of 750 to 716 in the first game and from F. N. DuBois & Co. in the second, the score being 747 to 703. The Manufacturers and Salesmen in the third rolled up a score of 820 against F. N. DuBois & Co., with a score of 596. The highest individual score up to January 12 was made by Hogenauer, of the DuBois team, with 242 pins, 7 strikes and 3 spares. Welch, of the Master Plumbers, is a close second with 237 pins and the same number of strikes and spares. Lawrence, of the National Lead Company, occupies third place with 235 pins, with 7 strikes and 1 spare. Emery, of the Manufacturers and Salesmen, occupies the fourth place with 234 pins and 7 strikes and 3 spares. The highest team scores thus far are: The John Simmons Company, 880; Smith & Read, 877; the Master Plumbers, 863; A. L. Perkins, 840; F. N. DuBois & Co., 838; Manufacturers and Salesmen, 827; the Boynton Furnace Company, 817; the National Lead Company, 815; and the Plumbers' Trade Journal, 809. The Master Plumbers lead in the number of games won with 8 to 2. Abendroth Brothers come second with 7 to 3.

PHILADELPHIA.

The annual meeting of the Philadelphia Association of Master Plumbers was held in the Builders' Exchange, 18 South Seventh street, on Thursday, January 4. In addition to a luncheon and musical program which were provided for the occasion, the annual election of officers took place and resulted in the following choice: President, Harry L. Righter; vice-presidents, Harry B. Lentz, George Moeller, Samuel W. Barnes, D. F. Durkin, Jr., and Edward F. Roberts; treasurer, William Harkness; secretary, S. Louis Barnes; sergeant-at-arms, E. H. Mackay; board of directors, William Boal, Gregor Drummond, Thomas J. Barry, George F. Uber, Frank Kramer, I. Barclay Thorn.

NEW JERSEY.

Charles Kinlon, of Kinlon Brothers, 609 Washington street, Hoboken, passed on at his home in that city on New Year's morning, January 1. He was one of the oldest and best known master plumbers in the State.

The J. F. Hanley Company, of 224 Ferry street, Newark, N. J., has been incorporated with a capital of $6,000 to conduct a plumbing and steamfitting business. The incorporators are: James F. Hanley, George H. Lange and Ellen Hanley, all of Newark, N. J.

The good fellowship for which the Newark Association of Master Plumbers is famous has been gathering momentum since its outing last summer. To allow it vent and utilize its energy for the upbuilding of the association, its eleventh annual banquet will be held at L. Achtelstetter's, 844 Broad street, Newark, on Wednesday evening, February 14, at 6:30 o'clock. The tickets will be $3.50 each, and can be procured from the members or the committee, which is composed of the following gentlemen: A. Selden Walker, chairman, 341 Main street, East Orange; F. J. Sturn, treasurer, 900 Broad street; Edward M. Sterling, secretary, 60 Lafayette street; Ira Budd, Walter I. Champlin and Samuel F. Wilson. Good talent will be in attendance and an enjoyable evening provided by the committee, who are past masters in the art of providing for the gratification of the wants of the inner man.

At the regular meeting of the Master Plumbers' Association of Newark, N. J., held Thursday evening, January 11, the following officers were installed for the ensuing year: President, S. F. Wilson; vice-president, William Spatcher; recording secretary, H. F. Baillet; financial secretary, William Jacobi; treasurer, F. J. Sturn; sergeant-at-arms, R. Zeitler. Past President Ira Budd officiated, assisted by Past President W. Champlin and Third State vice-president Edson Ganabrant, of Orange, lent his benign smile to the occasion, representing the State Association. The State President and National Vice-President were absent on association duty at Long Branch. The reports of officers for the past term show the association to be in a good financial condition, despite the strenuous year just passed. After the business meeting a social evening with a copious lunch, sufficient liquid (hard, soft and medium) to flush the system and the customary smoke test were indulged in. Professional and amateur talent presided at the piano and amid song and story renewed interest was awakened to presage a bright future for this active association.

THE SUNNY SOUTH.

Announcement is made of the engagement of Miss Helen G. Keane and Mr. Henry B. Davis, inspector of plumbing of the District of Columbia. The marriage will take place on January 25, at 8 p. m., in the parlors of a new home at 1339 Fairmont street, N. W., which has just been completed and furnished throughout for the happy couple.

The plumbing firm of James E. Phillips & Son, of 1421 East Main street, Richmond, Va., has been dissolved on account of the demise of James E. Phillips, and a new partnership has been formed by James E. Phillips, Jr., and Mary A. Phillips, widow of the late James E. Phillips. The old firm name will be retained and James E. Phillips, Jr., will act as general manager.

The Los Angeles Limited, via the Chicago and Northwestern railway, leaving the Northwestern station, Chicago, daily at 10 p. m. and arriving in Los Angeles at 4:45 p. m. the third day, is proving to be a popular service for tourists to Southern California. The train is electrically lighted and has all the embodiments of up-to-date service. Any of our readers contemplating a trip to California should make early application for sleeping car reservations to H. A. Gross, G. P. A., 212 South Clark street, Chicago.

TOO LATE TO CLASSIFY

WANTED—POSITION AS MANAGER IN THE PLUMBING business by a thoroughly experienced plumber and gas fitter; 19 years' experience, five years as master plumber and some experience in steam and hot water heating; can estimate from blue prints, handle men and take charge of any class of work; not afraid of work. Box 591, Keyser, W. Va.

A SELLING AGENCY WITH ALL POSSIBLE FACILITIES to handle responsible accounts in the metropolitan district, as well as the New England states, wishes to add one or two plumbing supply lines to its present established trade; best of references available. No. 443, DOMESTIC ENGINEERING, Chicago. 1-20

Two years ago we introduced a closet which we believed could not freeze even in the coldest weather. Practical use has proven this theory correct.

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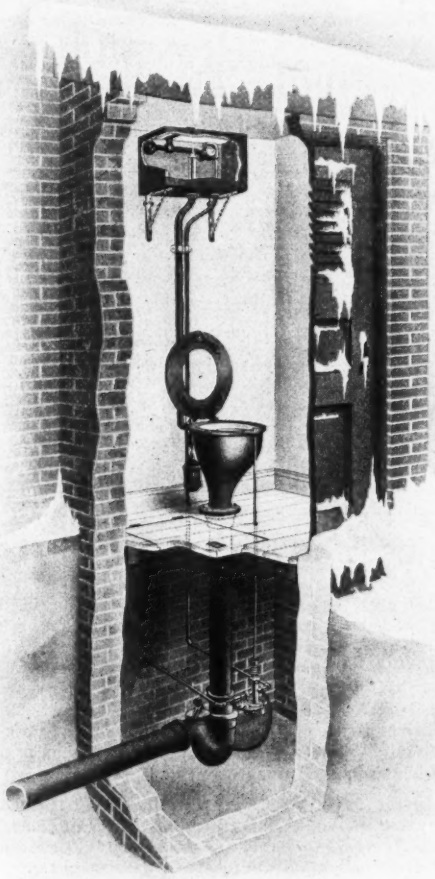

is a demonstrated success.

Note that working parts in cistern are above water-line—no two surfaces in contact when not in use —no complicated parts, chain, ball-cocks or springs —no float to clog—rod operating hopper-valves is in centre, in front—no strain on seat and hinges.

For illustrations and particulars, address

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WATER CURTAIN FIRE PROTECTION.

An instructive and valuable test of a new system to protect buildings from flames in adjacent structures was made in New York, according to the American Inventor. The principal feature of the demonstration was the almost perfect protection afforded a sky-scraper building from catching fire from the flames of near-by buildings in congested districts of narrow streets.

The experiment was made at the eighteenth story of the Manhattan Life Insurance Company building, 64 to 70 Broadway, New York. The insurance company recently added to its standpipe fire plant what is known as the Regan water curtain, which has been patented by former Chief Regan, of the Boston fire department.

On the eighth floor and on the fifteenth floor, on the Broadway side of the Manhattan Life building, 3½-inch pipes were connected with the city water system in the street. The nozzles of the pipes were split into three tiny slots, so that the stream spread into fine spray. This system of pipes stretched across the front wall of the building, made a canopy of water, covered the front of the building and ran off in great streams for a block up and down the curb of Broadway.

The plan is to turn on this system should there be a fire across the street, and thus obviate any danger from heat or from a leap of flames across to the Manhattan Life.

A second canopy was turned on at the south side of the building, next to the non-fireproof Consolidated Exchange. A third system protected the rear, which touches on the New York Stock Exchange New street side. There are standpipes on the north side of the Manhattan Life.

The only criticism made by the fire insurance men was that the force pump in the building, with its capacity of 500 gallons a minute, could not get water enough out of the Broadway main to make a sufficiently heavy canopy. In case of fire, when engines by the score would be tapping the main, it was feared the canopy system might fail, but it was shown that artesian wells in the cellar of the Manhattan Life could be used to increase the supply. The fire insurance experts said that if there were pressure enough the idea was an excellent one. Its cost was less than $1,000.

EARLY HISTORY OF VENTILATING APPARATUS.

When, in the year 1857, B. F. Sturtevant, the young shoemaker of Norridgewock, Me., gave up his cobbler's trade and came to Boston to introduce and manufacture his ingenious pegging machine designed for doing away with the drudgery of manual labor of pegging shoes, he little thought this was the first step toward the building up of a manufacturing company destined to become the largest of its kind in the world.

A deep interest in all that pertained to the manufacture of shoes, naturally led him to introduce various other labor-saving devices, among which was a buffing wheel for smoothing the soles. The dust created in the use of this machine proved an annoyance until he hit upon an arrangement of exhaust fan for drawing it away. The only purchasable fan of that day was an extremely crude and inefficient affair. With characteristic thoroughness he designed and built a new type embodying many improvements.

Its success in connection with buffing wheels led, naturally enough, to its trial for the removal of refuse from wood-working machinery, and thence to its employment for handling all classes of light material. Almost coincident was its application for blowing forge, boiler and cupola fires. Foreseeing, even then, the vast possibilities of the business, Mr. Sturtevant established himself in a small way, with half a dozen workmen at 72 Sudbury street, Boston.

It was soon evident that a different type of fan was required for the creation of the 10 to 16-ounce blast usually necessary in cupola furnaces. Naturally, with his experience along an entirely different line, he was comparatively ignorant of the details of pig iron manufacture, and even of the existing practice in the matter of blast production. But this was an incentive rather than an obstacle to him.

Utilizing the income from his peg-wood business, he deliberately undertook an exhaustive series of investigations upon the operation of cupola furnaces throughout the country. In the majority of cases he found them equipped with the rotary or so-called "Positive Blast" blowers and quickly realized that his sole hope for success lay in producing a machine that should be their superior in every respect.

To this end he conducted numerous experiments upon blowers of all imaginable sizes, shapes and designs, until he was able to intelligently evolve from them all a single complete design known as the "Steel Pressure Blower," in which were utilized the good points of the others and from which was eliminated all that was inferior. At about the same time there was also developed a new form of volume blower after the general principles of the pressure blower, but designed primarily for operation at lower speeds and for use where quantity rather than pressure was desired. To this period also belong the first experiments with a combination of steam heater and fan as a drying and heating apparatus. Small in its way, this early apparatus consisted of a tubular heater, somewhat after the order of a surface condenser, through the tubes of which the air was drawn by the attached fan and around which the steam was allowed to circulate. Although first applied for the drying of various materials as placed in drying rooms, it was soon evident that the same device possessed the qualities of a remarkably economical and convenient heating and ventilating apparatus. For by its use air, thus heated, could be forced long distances through pipes, and applied for warming such various apartments as might be desired.

FORCED DRAFT.

"Forced draft," said Admiral Melville in a recent paper, "dates back to Stevens' Rocket, and its first use for marine purposes was by Mr. Robert L. Stevens on the Hudson river steamers in our own country prior to the Civil War. During that war Mr. Isherwood built a number of gunboats which used forced draft, but it had fallen into disuse until about 1882 for naval vessels, when it was introduced into the English navy and still later was applied in the merchant service.

In the naval machinery forced draft has been of the greatest possible importance, because it has reduced boiler weights probably almost one-half. In the navy the natural limitations as to space and weight prevent the use of forced draft with very much economy of fuel. It is obvious that if the rate of combustion is increased from 15 pounds of coal per square foot of grate to 40 pounds, there ought to be an attendant increase of heating surface. In the merchant service, or at least in certain classes of vessels in that service, it is possible to do this, and in one of my annual reports I made a comparison between the boilers of a merchant vessel called the Iona and those of the Baltimore. In the Iona there were 75 feet of heating surface for one grate, while in the Baltimore the ratio was about 30 to 1; but had the Baltimore's boilers been designed with any such ratio, their weight would have been almost double the weight of all the machinery of that vessel as actually built."

Rapid HEATERS

Are Simple, Durable and Efficient

No screens or sieves in the burner to clog up or give trouble.

The whole burner is made from fine gray iron, acknowledged to be the **only** material standing continual hard use in gas burners.

The combination of Bunsen and Argand principles has proven the most efficient of all types of gas burners.

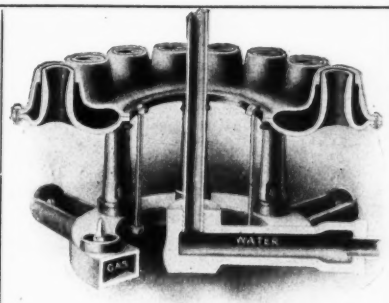
Rapid Bath Heaters using "Rapid" burners utilize 92 heat units out of a possible 100.

No other heater compares in one of the many valuable features found in "Rapids."

Mr. Dealer :—You want the **best**—your customers and your future business demand it.

Install Rapid Heaters—they will please—Fully Guaranteed.

RAPID HEATER COMPANY, GRAND RAPIDS, MICH.



PIPE COVERINGS.

R. T. Strohm, in the American Electrician, says in regard to pipe coverings: Asbestos, hair-felt, magnesia, cork, mineral wool, pressed paper, sawdust, charcoal, ashes, slaked lime, coke and pine wood have all been used with varying degrees of success, although many of these are not common, and are used only in special instances.

A good pipe covering must possess several distinctive merits, which will be mentioned in the order of their importance. First, the material must prevent the passage of heat between the pipe and the surounding atmosphere, outwardly in the case of a steam pipe, and inwardly in case the pipe conveys brine for refrigerating purposes.

A bare steam pipe dissipates heat from the steam in three ways—by radiation, by conduction, and by convection. The covering must then be able to reduce or prevent, to a great extent, all these losses.

To obstruct the pasasge of radiant heat is not a difficult matter, since there are numerous substances which will accomplish this purpose. But the covering must also prevent loss by convection and conduction. The heat of the steam is imparted by contact to the inner surface of the pipe, and iron being an excellent conductor, the heat is rapidly transmitted to the outer surface. Here, if the pipe is bare, the air immediately surrounding the pipe is heated by contact, and this air, rising because of its lower specific gravity, gives place to unheated particles. This induces a circulation, the heated particles rising and conveying their heat to the more distant ones, constituting the process of convection. Consequently, in order to reduce the loss due to convection, there must be no circulation of air or other medium between the pipe and the covering. In other words, the covering must either fit snugly to the pipe, or it must entrap the air in small cells or chambers, which will not permit of circulation.

In order to prevent loss by conduction, the covering must obviously be made of material having a low thermal conductivity. All the substances mentioned in the first paragraph possess the foregoing requirements to a greater or less degree, and are therefore available as coverings. But hair-felt, asbestos, cork and magnesia have a much higher efficiency than the others in this respect.

Readers of Domestic Engineering are urged to examine the advertising pages of this paper. Enterprising manufacturers and jobbers are showing novelties for plumbing and heating men. There is no better way to keep abreast of the times than by reading our advertising pages. In writing advertisers please mention Domestic Engineering.

CLEVER THOUGHTS.

By Otis H. Kean, in his Booklet, "Gray Matter."

Dream your dreams. Leave the old world behind you now and then. Forget the brick and mortar part of your existence and let fancy lead you into that misty land where your innermost desires take form and the things that you would, come forth and seem to be.

All men of power are dreamers. In these mental journeys we travel the roads where have walked the discoverers, the scientists, inventors, painters, musicians, and not least, the men who have made the proverbial mare go—the business builders, the money getters—they have all been dreamers. Depend upon it! the realities that they have brought to pass were one time ethereal figures of their minds.

To take a mental journey now and then, beyond a world we can grasp and see and hear, is to enlarge our ego, to expand our spiritual being and extend our horizon and—accomplish things.

Nobody wants to be a "one stringer"—to think and act and live in a groove.

We want to make the circumference of life's circle as great as we can and touch it at as many points as possible—for every new contact brings a new experience, a new sensation, and increases consciousness.

The more we feel and see and hear, the more we live—the more we want to.

But in business—in that play called work—this is essentially the day of "one stringers"; that is to say, it is the day of the specialist.

Now, a specialist is a man who recognizes the limitations of life and discovers that he can probably not learn to do more than one thing and do it exceedingly well. Besides, every man is fitted by Nature to do some one thing better than he can do anything else.

The man who can cut you up and put you together again, as good as new, was doubtless intended by Nature as the repair man for this poor, frail human race.

But this same man might be color-blind or have no ear for music or head for mechanics.

And the man who faints away at the sight of blood may be building the world's bridges or discovering new planets.

So that when a man finds that he is fitted by Nature to do a thing and then goes ahead and does it, he is simply working out a natural law.

A man may have hobbies and side issues for relaxation, but for serious occupation, if he is to win money or laurels he must "stick to his knitting." Some few men in the world have been able to do many things and succeed. But, Nature only strikes thirteen now and then—

and most of us arrive between the strokes. And since life is short—here's to the man who can—to the "one stringer."

Successes "are such stuff," dear friend, "as dreams are made on"—plus energy and perseverance.

The past has gone, the present is fast going and the future will soon arrive. Get busy, my friends, get busy!

JEST TURN TO AND DIG.

By Harry T. Fee.

Silas Snodgrass was a farmer
As lived up in San Joaquin,
And about him folks kept saying—
"Curious feller ever seen."
But he always had the best crops
And rode in a bang-up rig,
And he 'lowed the way he did it
Was to jest turn to and dig.

Didn't waste much time er talking,
"Hedn't none to spare," sez he,
But through all his words there always
Ran his quaint philosophy.
If you'd ask him howsomever
He raised 'taters quite so big,
He'd say: "Well, thet's very simple
If you jest turn to and dig."

Didn't talk much 'bout his neighbors,
Seemed to take a cheerful view;
Ask him how he was successful,
This is what he'd say to you:
"You can raise the best potatoes,
You can own the finest pig,
And the best corn crop a-goin'
If you jest turn to and dig."

"People," sez he, "think I'm lucky,
Cour'us how some folks can't see;
Good hard work and plenty of it
'Sall the luck I claim, by gee!
Makes no difference what yer tackle,
Whether things be small er big,
One thing sure, you'll be successful,
If you jest turn to and dig."

PATENTS

809,292. **Gas Engine.** William T. Fox, Rochester, N. Y.

809,385. **Apparatus for Discharging Liquids in Vacuo.** Jarard W. Lytton, Portsmouth, Va.

809,486. **Radiator.** Willie H. Wyant, Tabor, Iowa.

809,503. **Steam Boiler.** Charles W. Hawkes, Chicago, Ill.

809,645. **Ventilating Apparatus.** Charles H. Treat, Detroit, Mich., assignor to American Blower Company, Detroit Mich, a corporation of Michigan.

809,672. **Automatic Indicating and Regulating Hygrometer.** Stuart W. Cramer, Charlotte, N. C.

809,720. **Basis Cock.** Philip Mueller, Decatur, Ill, assignor to H. Mueller Manufacturing Company, Decatur, Ill., a corporation of Illinois.

809,810. **Incandescent Gas Lamp.** John F. W. Jost, Philadelphia, Pa.

809,895. **Faucet.** Joseph O. Beazley, Baltimore, Md.

809,722. **Automatic Valve for Water Closets.** Joseph C. McCarl, Weston, W. Va., assignor of one-fourth to William J. Alexander, one-fourth to William H. Hoyt, and one-fourth to John O'Hare, Norwalk, Ohio.

809,857. **Slide Gate Valve.** Alfred Stenwall, Kewanee, Ill.

805,882. **Radiator.** George I. Rockwood, Worcester, Mass.

805,913. **Pipe-Tongs.** Henry R. Hill, Caldwell, Ohio.

805,927. **Wrench and Pipe-Cutter.** Ferdinand Mineck, Danbury, Conn.

805,986. **Acetylene-Gas-Generator Lamp.** William O. Nelson, Baltimore, Md., assignor of one-tenth to Charles Selden, Baltimore, Md.

806,085. **Pipe-Bender.** Stephen M. Green and William T. McFarland, New York, N. Y.

806,087. **Acetylene-Gas Generator.** Henry Symonds, Longbeach, Cal., assignor, by direct and mesne assignments, to the Superior Light & Heat Company, of Los Angeles, Cal., a corporation of California.

PATENTS PROCURED in all countries by

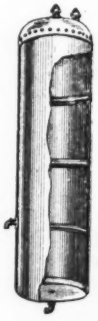
Frank M. Ashley M. E.

EXPERT IN PATENT CAUSES

Inventions relating to Plumbing and Heating a Specialty

138 Liberty Street, NEW YORK

MEMBER: New York Electrical Society. Franklin Institute of Pennsylvania, American Society of Mechanical Engineers, American Institute of Electrical Engineers. National Association of Stationary Engineers.



Boston Copper Range

BOILERS

ARE ABSOLUTELY THE BEST.

We make them in all styles and sizes. We have four grades of tank pressure boilers and our direct pressure boilers are built to stand any required test up to 400 pounds. We are also makers of Barbers' boilers, spun copper floats, heavy copper floats for steam traps and corrugated copper gaskets. Write for circular, prices and discount.

Dahlquist Mfg. Co.

40 W. Third St., South Boston, Mass.

Boston Reference: DAVID CRAIG, Ex-President National Association Master Plmbers, 70 Broad St., Boston, Mass.

Domestic Engineering

Published Weekly by Domestic Engineering (Incorporated), $1.00 a Year, 5 cents a Copy. Office: 58-64 North Jefferson Street, Chicago. Tel. Monroe 816.

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Entered in the Postoffice in Chicago, Illinois, as mail matter of the second class, Dec. 12, 1901.

Member of the Trade Press Association.

Member of the Manufacturers' Credit Company.

January 20, 1906

Industrial Opportunities

The rate for advertising under this heading is 10 cents a line an insertion. The average advertisement runs six words to a line. To insure insertion in this column copy should be received not later than Wednesday afternoon. If received before Thursday evening, advertisements will be Advertisements" on page 44—One man from inserted under the heading "Late Classified Omaha writes: "I feel on good terms with Domestic Engineering, for it was through answering an ad in the 'Trade Wants' column that I am now located in the hustling western country, having come here from New Jersey."

Manufacturers Wanted

GOOD CHANCE—A NEW YORK TOWN of 2,410 people, railway junction, near inexhaustible fuel supply, adjacent to big markets, cheap labor not dominated by union, offers exceptional opportunity for a manufacturer of plumbing or heating supplies. Address No. 25, care of DOMESTIC ENGINEERING, Chicago. tf

WANTED—FOR A TOWN OF 40,000, within two hundred miles of New York City, a house heating boiler and radiator plant; railway connections of the best; cheap fuel; trained labor in the town; an interesting proposition can be made. Address No. 15, care of DOMESTIC ENGINEERING, Chicago. tf

WANTED—A PLUMBERS' WOODwork factory for a town most advantageously located with reference to a hardwood supply, with plenty of woodworkers to draw upon for labor, offers a fine opportunity for some manufacturer who desires to change his location, or establish a new plant. Address in confidence No. 33, care of DOMESTIC ENGINEERING, Chicago. tf

Electric Light Plants

A TOWN IN NORTHERN TEXAS, with nearly ten thousand people, offers a magnificent opportunity for the establishment of an electric lighting and power plant. Full particulars upon application to No. 36, care of DOMESTIC ENGINEERING, Chicago. tf

AN ELECTRIC LIGHT PLANT IN A West Virginia city is not in the right hands; a good manager can acquire it at a very low cost and can make good money out of it. Address for particulars No. 29, care of DOMESTIC ENGINEERING, Chicago. tf

Gas Plants

WANTED—A GAS PLANT—AN ILLInois town of 2,500, near Chicago, has an electric lighting plant, but offers a good chance for a fuel gas plant; franchise to responsible people assured; a fine opportunity. Address No. 19, care of DOMESTIC ENGINEERING, Chicago, Ill. tf

WANTED—A NEBRASKA TOWN OF six thousand people, rapidly growing, with good prospects, needs and would welcome a gas lighting and fuel plant. Good gas coal can be had cheaply. Enough consumers can be had to make it pay from the start. Address No. 17, in care of DOMESTIC ENGINEERING, 58-64 North Jefferson street, Chicago, Ill. tf

Locations for Plumbers

WANTED—A PLUMBER, STEAM AND gas fitter to locate in a rapidly growing town with present population of 2,300 where waterworks are just being constructed. Good contracts assured from the start. People are largely rich, retired farmers, who can have the best the market affords. Address, for full particulars, No. 1 , in care of DOMESTIC ENGINEERING, 58-64 North Jefferson street, Chicago, Ill. tf

Locations for Steamfitters

WANTED—A STEAM AND HOT WAter fitter who understands his business and knows how to push it, can build up a good business in a town of 12,000 in Ohio. People now in trade are not progressive nor up-to-date. Address, for full particulars, No. 23, in care of DOMESTIC ENGINEERING, 58-64 North Jefferson St., Chicago, Ill. tf

Locations for Hardware

A SPLENDID OPENING FOR A HARDware, agricultural implement and mill supply store is offered in a location in Missouri where a new junction town is to be established in a rich agricultural community. This is an opportunity such as seldom comes to a man. Write today. Address No. 28, in care of DOMESTIC ENGINEERING, 58-64 North Jefferson St., Chicago, Ill. tf

Locations for Mill Supplies

TO MILL SUPPLY DEALERS—A RAPidly growing manufacturing city, now numbering 15,000 people, can support a mill and factory supply store, and its sure and certain growth will cause a great expansion in the business when established. Supplies now have to be secured from a town 50 miles away. Address No. 31, in care of DOMESTIC ENGINEERING, 58-64 North Jefferson St., Chicago, Ill. tf

Plumbing Schools.

PLUMBING SCHOOL — Special rate. Two months' instruction, day class, $25. Practical School of Plumbing and Heating. 3639 Nicollet Ave., Minneapolis, Minn. 10-06

Classified Advertisements

Situations Wanted.

WANTED—POSITION AS SALESMAN for wholesale plumbing supply house by a young man well posted; acquainted with trade in Ohio; can furnish A1 references. No. 411, DOMESTIC ENGINEERING, Chicago. tf

WANTED—POSITION AS FINISHING foreman in brass shop where plumbing or steam goods are manufactured; up to date and experienced; sober, honest and with best of references. No. 441, DOMESTIC ENGINEERING, Chicago. 1-27

WANTED—Position by first-class gas fitter and general gas man. Can handle all classes of work, including plumbing; will take position in any capacity; correspondence solicited. Address Fred C. Lantz, 114 Court street, Dayton, O. 1-20

WANTED—POSITION AS MANAGER of plumbing and heating establishment; twelve years' experience as estimator, buyer and foreman; at present engaged on large city work; prefer smaller town. No. 401, DOMESTIC ENGINEERING, Chicago. 2-10

Help Wanted.

WANTED—A STEAM AND HOT WAter boiler and specialty salesman for Illinois, Wisconsin and Eastern Iowa. No. 438, DOMESTIC ENGINEERING, Chicago. 1-20

CORRESPONDENCE SOLICITED with a young man competent to install plating department. State salary. Address Macungie Brass & Mfg. Co., Macungie, Pa. tf

WANTED—BY A WELL KNOWN BOILer and radiator manufacturer, a representative to operate in the northwest making headquarters at Minneapolis. Address 392, DOMESTIC ENGINEERING, Chicago. tf

WANTED—YOUNG MAN AS SALESman who understands plumbing and heating supply line, to cover New Jersey territory; one residing in New Jersey preferred; state experience and salary. No. 431, DOMESTIC ENGINEERING, Chicago. 1-27

WANTED—BY BOILER MANUFACturer, an energetic young man as salesman; must be acquainted with the trade in Philadelphia and vicinity; give experience, reference and salary expected. No. 439, DOMESTIC ENGINEERING, Chicago. 1-27

WANTED — CORRESPONDENCE SOlicited with some first-class company manufacturing a first-class line of heating boilers; object, salesman; after Dec. 31, 1905. Address No. 354, care of DOMESTIC ENGINEERING, 64 N. Jefferson St., Chicago. tf

WANTED—A SALESMAN TO REPRESent a large manufacturer of boilers and radiators, to operate in Western New York and Pennsylvania. Give past experience, references and salary expected in first communication. No. 391, DOMESTIC ENGINEERING, Chicago. tf

WANTED—BY A LARGE CONTRACtor in New York, heating and ventilating engineer, capable of soliciting work, estimating and managing business; must be familiar with New York City trade; none but first class man need apply; A1 opportunity for right man. No. 433, DOMESTIC ENGINEERING, Chicago. 1-20

WANTED — BILL CLERK. FIRST class experienced man to take charge of billing desk in office of wholesale plumbing supplies house; must be first-class in every respect and strictly sober; no drones need apply; state salary. No. 402, DOMESTIC ENGINEERING, Chicago. tf

WANTED—BY LARGE SOUTHERN foundry, making cast iron staple plumbing goods, to correspond with a practical foundryman, who has had experience in making cast iron steam fittings or heating boilers and radiators, with view to adding one or both lines. No. 432, DOMESTIC ENGINEERING, Chicago. 1-20

WANTED—A FIRST CLASS PLUMBER to take charge of work in shop that employs from three to six men; must have good recommendation; will be expected to take from $250 to $1,000 stock in a hardware and plumbing business which made 50c on the dollar last year; location Southern California; a good thing for the right man. Address Dealer, 845 E. St. John St., San Jose, Cal. 1-20

WANTED—A COMPETENT ENGINEER to act as assistant to the general manager of a large corporation manufacturing a line of cast iron specialties and to take charge of the construction and creative department of the business. He must have some experience in designing and operating labor saving appliances in the iron foundry line and know how to handle men and machinery. A liberal salary will be paid to the right party. Applicant must not be over middle age, must be energetic and understand both the theory and practice of iron founding and machine shop work. No. 436, DOMESTIC ENGINEERING, Chicago, giving age, previous experience and salary expected. 1-20

WANTED—SALESMEN WHO CALL ON plumbers to handle side line; $3 commission; quick and easy seller; sample goes in vest pocket and will be sent you for the asking; state your line and territory. Address Fred Schulder, 613 St. Clair Ave. N. W., Cleveland, O. 1-20

Miscellaneous.

WANTED—2-INCH PIPE THREADING machine; prefer No. 7 Jarecki; hand or power. Also electric motor for same; state size, voltage, make, price, etc. No. 434, DOMESTIC ENGINEERING, Chicago. 1-20

WANTED—Correspondence with manufacturer of line of plumbers' brass goods, N. P. Basin Cocks, etc., also specialties, who is not now represented in Pittsburg district. No. 442, DOMESTIC ENGINEERING, Chicago. 2-3

WANTED—THE PRESENT ADDRESS of Chas. W. McDermott, who was in business in 1904 at 144 Harrison avenue, Boston, Mass. A suitable reward will be paid for this information. Write to No. 361, care of DOMESTIC ENGINEERING, 58-64 North Jefferson St., Chicago.

WANTED—CATALOGUES TO COMpile for plumbing, heating, mill and general supplies, by an experienced man who thoroughly understands the above lines, also the catalogue business. A1 references, also samples of completed works. No. 440, DOMESTIC ENGINEERING, Chicago. tf

For Sale.

PLUMBING SHOP FOR SALE. Write Ray E. White, Charlotte, Mich. 1-20

FOR SALE—1 No. 6 Stillwell feed water heater; One 4½x3x4 Smith-Vaile automatic pump and receiver. H. H. Meerhoff, Richmond, Ind. 1-27

FOR SALE—HALF INTEREST IN ESTablished plumbing and heating business in town near Chicago; high class work; man must be thorough mechanic; small capital required. No. 437, DOMESTIC ENGINEERING, Chicago. 1-20

FOR SALE—A WELL ESTABLISHED plumbing, heating and sheet metal work business in a hustling city of 5,000 inhabitants; stock will invoice about $8,000, but will cut to suit purchaser; business averages about $30,000 a year. Address Lock Box 366, Sycamore, Ill. tf

CAPITALISTS—WHY NOT ANSWER this question? Why continue this waste of millions yearly for rubber hose around your industries, railroads, coke ovens, iron and steel works? Ask your purchasing agents the amount and cut it 90 per cent by demanding the use of my U. S. and foreign patents. Improvements pending. L. T. Foreman, Omaha, Neb. tf

Books.

AMERICAN PLUMBING PRACTICE. Just the book to help ambitious plumbers develop their trade from cheap to high grade work. 260 pp., 8x11 inches, 536 illustrations. Cloth, $3.00. DOMESTIC ENGINEERING, Chicago.

LADD'S DISCOUNT BOOK. 200 TAbles, 120,000 computations. Covers the whole range of discounts, both simple and complex. Results all figured out for you ready for use at a glance. You need it in invoicing, in setting prices and in making inventories. $4.00. DOMESTIC ENGINEERING, Chicago.

BUYERS' READY REFERENCE LIST.

Compressors, Air

THE AMERICAN WELL WORKS, AURORA and Chicago, Ill. Mfrs. "American" Air Compressors, all sizes, for all duties, efficient and satisfactory.

Gas Fixtures

E. BAGGOT CO., 169 ADAMS ST., CHIcago, Ill. Makers of Gas Fixtures and Fittings.

Gas Mantle Machinery

ADVANCE MACHINE CO., 194-202 S. CLINton St., Chicago. Makers of the latest machinery for making gas mantles.

Engines, Gas & Gasoline

THE AMERICAN WELL WORKS, AURORA and Chicago, Ill. Mfrs. "American" Gasoline Engines, all sizes and styles, for all duties. Economical.

Expansion Bolts.

STAR EXPANSION BOLT CO., 147 CEDAR St., New York City. Manufacturers of Expansion Bolts in Iron, Brass and Lead. Star Screw Anchors (Lead) are indispensable to Plumbers.

Lamps, Gas

THE AMERICAN SELF-LIGHTING LAMP Co., Peoria, Ill. Makers of the American Gas and Gasoline Lamps.

Lifts, Air

THE AMERICAN WELL WORKS, AURORA and Chicago, Ill. Mfrs. "American" Air Lifts for pumping water. Large capacity.

Pipe, Cast Iron

CHAS. MILLAR & SON CO., UTICA, N. Y. Superior quality Cast Iron Gas and Water Pipe. Cast Iron Soil Pipe and Fittings, Cast Iron Screwed Fittings.

Pipe, Wrought Iron.

JOHN SIMMONS COMPANY, NEW YORK, Wrought Iron Pipe, Bends and Coils. Prices low as good work permits.

Pipe Hangers.

THE AMERICAN PIPE HANGER CO., South Weymouth, Mass. The most satisfactory pipe hanger ever made.

Pumps

AMERICAN STEAM PUMP CO., BATTLE Creek, Mich. Makers of Marsh Steam Pumps for hot and cold water.

Pumps, Centrifugal

THE AMERICAN WELL WORKS, AURORA and Chicago, Ill. Mfrs. "American" Centrifugal Pumps, economical, efficient.

Pumps, Steam and Power

THE AMERICAN WELL WORKS, AURORA and Chicago, Ill. Mfrs. "American" Steam and Power Pumps, all sizes and styles, for all duties, practical, economical.

Radiator Bronzes, Etc.

EUGENE ARNSTEIN, CHICAGO, ILL. Maker of Radiator Bronze Powders, Bronzing Liquids and Enamels, specially prepared and specially good.

THE FUCHS & LANG MFG. CO., 29 WARren St., New York, and 328 Dearborn St., Chicago. Mfrs. of Special Radiator Aluminum, Gold and Copper Bronzes and Liquids.

Traps, Steam

THE ALBANY STEAM TRAP CO., Albany, N. Y. Improved Return Steam Traps. Practicability and efficiency.

Water Closets

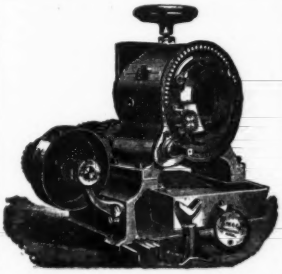
THE R. C. McCLURE CO., SYRACUSE, N. Y. Mfrs. of the very highest grade of Water Closets. Send for booklet.

Books

AMERICAN SANITARY PLUMBING, by Jas. J. Lawler. The Science and Mechanics of Plumbing handled in a practical way. 307 pp., illustrated. Cloth, $2.00. DOMESTIC ENGINEERING, Chicago.

STEAM AND HOT WATER FITTERS' Text Book, by Thos. E. McNeill. Prepared specially for the use of students at the New York Trade School. 140 pp., 5x7 inches, numerous illustrations and diagrams. Cloth, $1.00. DOMESTIC ENGINEERING, Chicago.

THE ART OF LEAD BURNING, by C. H. Fay. A New Book on a Paying Craft. A practical treatise that explains both apparatus and processes. Every Plumber should master this subject. "There's money in it." Printed on heavy plate paper with crash linen binding, 52 pen and ink illustrations, size 5½x8. Price, $2. DOMESTIC ENGINEERING, Chicago.



No. 78 Hand or Power. Range 2½ to 4 inches. R. H.

One Man cuts 15 inch Pipe

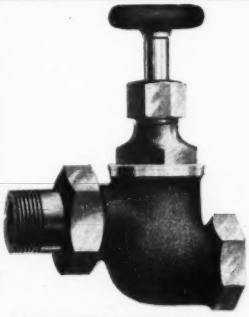
with **THE FORBES** easily

Smaller sizes proportionately easier.

Send for Catalogue.

THE CURTIS & CURTIS CO.,

13 Garden Street
Bridgeport, Conn.



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OHIO

RADIATOR VALVES

ARE UNSURPASSED IN FINISH, WORKMANSHIP, DESIGN AND OPERATION AND ARE SURE TO PLEASE YOUR CUSTOMERS

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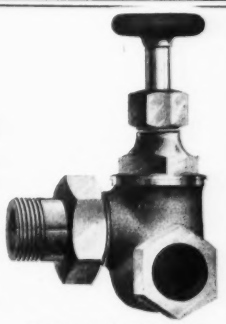
THE OHIO BRASS CO.

MANSFIELD, OHIO, U. S. A.



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Have You Ever

Given Our

Gas Service

and

Steam Cocks

A Trial

EVERY ONE GROUND IN PERFECTLY AND ABSOLUTELY TIGHT

Write for prices *Catalogue on request*

Queen City Brass and Iron Works

CINCINNATI, OHIO

MENTION DOMESTIC ENGINEERING

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KENNEDY VALVES
FOR ALL SERVICES AND PRESSURES

BETTER THAN MANY.

Gates, Globes, Angles, Radiator and Swing Checks. *Our Catalogue tells about them.*

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The Kennedy Valve Mfg. Co., Agents { Murphy-Dugger-Clark Co., Chicago / H. T. Lally, San Francisco / Louis Kaufman, New Orleans } **New York**

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Holly System

WRITE FOR "STORY" OF DISTRICT STEAM HEATING

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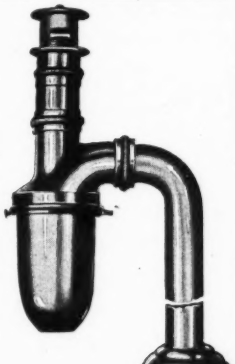

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THE MONARCH BRASS CO.,

CLEVELAND, OHIO,

at a great reduction from former prices.

Send for catalogue and revised discounts.

HIGH CLASS GROUND KEY—COMPRESSION AND FULLER WORK
SOLDER NIPPLES AND UNIONS

Post yourself on **Vacuum Heating**

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NEW LINE OF CATALOGUES WRITE AT ONCE FOR FULL PARTICULARS AND PRICES

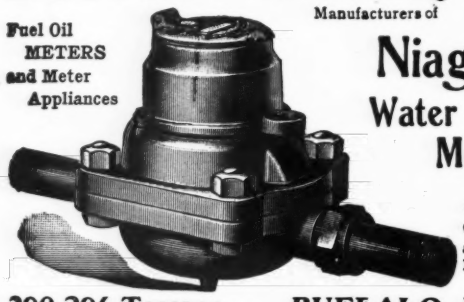
CHICAGO MINNEAPOLIS **Kellogg-Mackay-Cameron Co.** SOLE OWNERS KANSAS CITY SEATTLE

MENTION DOMESTIC ENGINEERING

BUFFALO METER CO.

Manufacturers of

Fuel Oil METERS and Meter Appliances

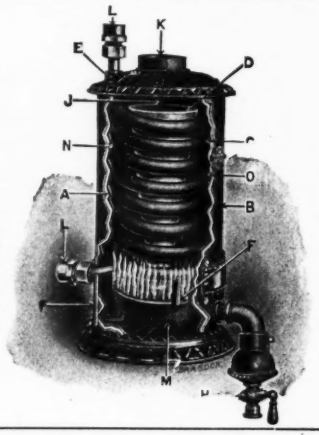


Niagara Water Meters

Write for CATALOG and PRICES

290-296 Terrace, BUFFALO, N. Y.

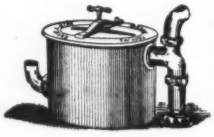
Lawson Improved Gas Water Heater



Is the most economical and up-to-date device on the market for furnishing hot water for household purposes. Send for booklet, giving full description.

LAWSON MFG. CO.
Homestead, Pa.

Excelsior Grease Trap



Well and favorably known; two sizes for hotels and restaurants and residences. Get list price and trade discounts.

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GRAND RAPIDS, MICHIGAN, U. S. A.

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Plumbers' Steam & Gas Fitters' Supplies

WAREHOUSES:
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50 & 52 Myrtle Avenue
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359 Pearl Street,
BROOKLYN, N. Y.

THE CAHILL IRON WORKS, Chattanooga, Tenn.

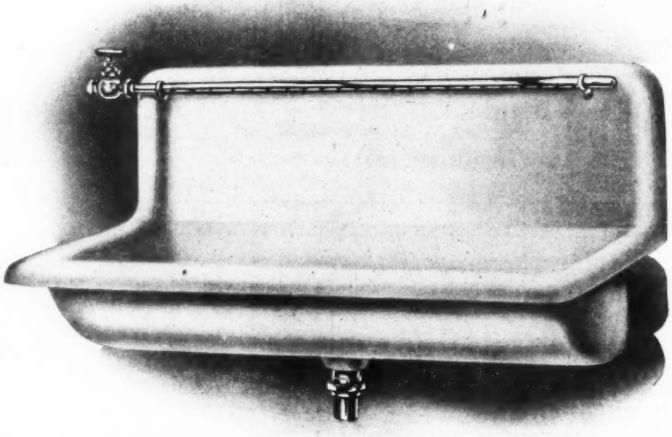


PLATE C 130—ONE-PIECE URINAL.

Our Motto: "Don't make in two pieces what can be made in one." We originate the ONE-PIECE fixtures. The others fall in line and follow—but remember we set the pace for them. Other new ideas soon.

See our new line of One-Piece "Southern Beauty" Lavatories, One-Piece Kitchen Sinks and One-Piece Slop Sinks shown in our Catalog "C".

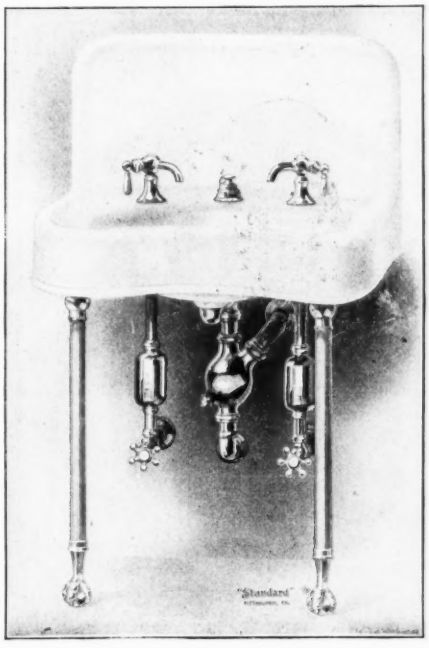
The Cahill Iron Works, Chattanooga, Tenn.

"Standard"

Porcelain Enameled "Neva" Lavatory

Particular attention is directed to the peculiar shape of the bowl of the "Neva" Lavatory. This feature appeals to many, as it permits the person using the lavatory to stand close to the bowl, thus avoiding splashing or dripping. In ad ition, the shape of the bowl follows the natural position of the arms when washing. These features have caused a heavy demand.

"Standard" Porcelain Enameled "Neva" Design Lavatory, with Slab, Curved Bowl, Back and Apron all in one piece, Nickel-plated Fluted Pattern Legs, with Concealed Wall Hanger, Nickel-plated "Torrance" Pattern Fuller Faucets, with China Handles and Indexes, Supply Pipes, with Globe Air Chambers and Compression Stops with China Indexes, Imperial Waste with China Index, and Unique Trap with Waste and Vent to Wall.



NEVA—PLATE P 528

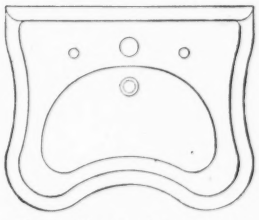


PLATE P 528 PLAIN VIEW
Note peculiar shape of bowl

DIMENSIONS

Slab, 20x24 ins.	Bowl, 11x19 ins.	Height of back, 12 ins.
Slab, 22x27 ins.	Bowl, 11x19 ins.	Height of back, 12 ins.

Sizes	20 x 24"	22 x 27"
Plate P 528, enameled all over as described	$52.50	$57.50
Plate P 528A, enameled all over, with Nickel-plated Legs, and Imperial Waste, less Faucets, Supply Pipes and Trap	34.50	39.50

MADE EXCLUSIVELY BY

Standard Sanitary Mfg. Co.

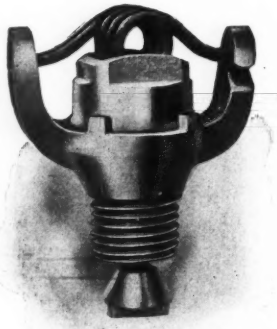
PITTSBURGH, U. S. A.

This Is A Rare Chance

to get the sole agency in your town for the

SIMPLEX Safety Valve

at inside rates



Patents allowed.

Every house in your town that has a hot water boiler needs one. Thousands of explosions in kitchen hot water systems occur every year with more or less serious results. Hot water boilers are frequently as dangerous as high pressure steam boilers. And it is just as foolish to let them go without safety attachments as it would be to do without a safety valve on high pressure boilers.

The Simplex Safety Valve

fills the need. It is very cheap—retails for only $1.00. Our discounts are very liberal, your profits large. Write at once for terms.

The Simplex Mfg. Co.

140 NASSAU STREET, NEW YORK

"The Standard of the World"

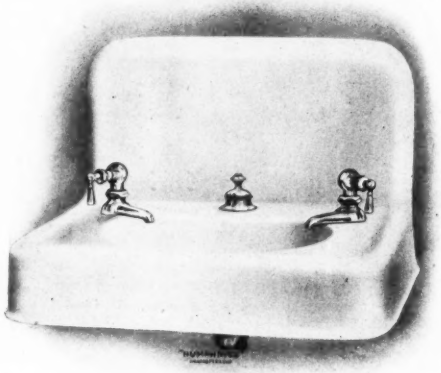
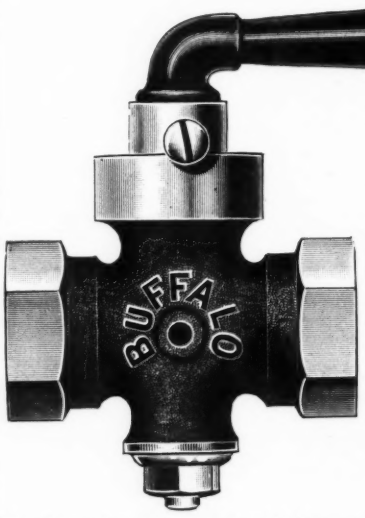


PLATE M 500

Made from the smoothest castings, faultless enamel, in highest finish This type of lavatory represents PERFECTION in PORCELAIN ENAMELED SANITARY WARE and is FULLY GUARANTEED STRICTLY FIRST QUALITY.

THE HUMPHRYES MFG. COMPANY, Mansfield, Ohio

BUFFALO Stop and Waste Cocks



Made of best red metal; have simplest reversible feature of any right and left stop and waste made. Each cock is carefully inspected in assembling, is given a 200-lb. hydraulic pressure test as near like actual service use as possible, and bears our trade mark.

We also make compression and fuller work, steam and gas cocks, soldering nipples, unions, etc. Send for Catalogue.

FRIES & COMPANY

89-93 Main Street, Buffalo, N. Y.

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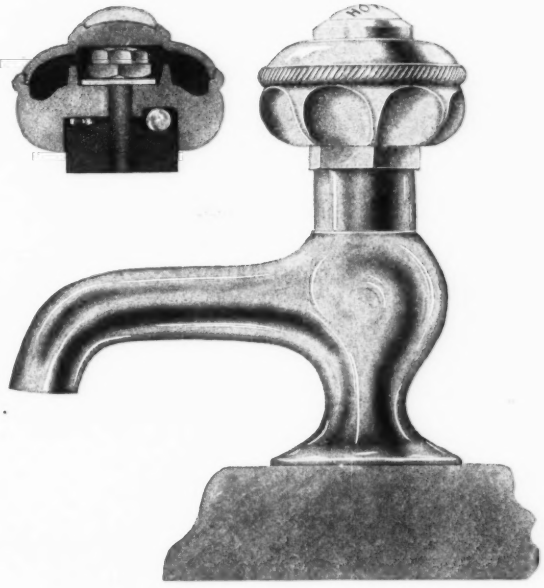
"PARAGON"

Patent "Crown" Handle Self-Closing Work



We are not introducing this line. It is known to all prominent Architects and Plumbers.

BUT

as usual, SUBSTITUTES HAVE BEEN PLACED ON THE MARKET.

BEWARE OF THIS

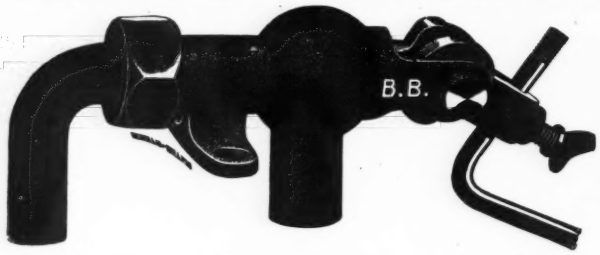
These substitutes are constructed similar to the OLD "BOSTON" OR "ZANE" LINES, and a handle slightly different in design to our "Crown" handle is used to deceive the Trade

DON'T BE DECEIVED

AS THE ORIGINATORS OF "PARAGON" PATENT "CROWN" HANDLE SELF-CLOSING WORK, we want to say to Architects especially, that the design of the "Crown" handle is only secondary. That the inner construction of our Self-closing Work is entirely different, and made ALONE BY US. THAT'S WHY WE CAN GUARANTEE THESE GOODS OUR REGISTERED TRADE MARK "PARAGON" IS STAMPED ON OUR ENTIRE LINE. INSIST ON IT.

The Sanitary Company, Cleveland, O.

THE B. B. HIGH PRESSURE BALL COCK



The Simplest and Best Cock Ever Made.

All sizes ½ inch to 3 inches inclusive for Top, Bottom or End Supply and also for Low Down Tanks with special float. No special packing required. Ground joint coupling which is always tight. Roller bearing lever on cam, reducing friction to lowest amount. No hammering, no singing or whistling. Has only one packing which is easily removed. Removable seat of best steam metal. We are making Floats stamped with our B. B. which are thoroughly guaranteed.

Ask Your Jobber for Them.

Boston Brass Company, - - - - 36 & 40 Oliver Street, Boston, Mass.

C. N. HOOPER, Dubuque, Ia.

VITREOUS ENAMELING
TECHNOLOGIST

Designs, builds and starts new plants. Improves quality and reduces the costs in those already established.

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"THE ROOKERY" CHICAGO

Members: NEW YORK STOCK EXCHANGE
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Make a Specialty of Unlisted Securities.

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PRATT AND MORGAN STREETS, CHICAGO

WRITE FOR PRICES

Bi-metallic Specialties, Lead Traps and Bends, Lead Pipe, Sheet Lead, Ebony Gloss Plumbers' Soil.

Trap Screw Ferrules, Brass and Iron Body.

High Grade Plumbers' SUPPLIES

End Ferrules, All Sizes.

WRITE US FOR PRICES WHEN IN THE MARKET FOR
Ferrules — End Reducing or Trap Screw — Stop and Waste Cocks — Compression Work, Gas Goods, etc.

OUR GOODS WILL PLEASE YOU.
Send for Catalogue.

ERIE, PA. **J. B. CAMPBELL BRASS WORKS.** ERIE, PA.

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We make it our business to spread your business, if—

you are handling the NATURO Closet. The mere display of these in your showroom is sufficient to entitle you to the privileges enjoyed by your customers. This is the easiest Closet in the market to sell because it is so simple to show people how much more healthy they will become by its use.

If you want to get busier, drop us a line.

THE NATURO COMPANY

C. H. MUCKENHIRM,
President.

Salem, N. J.

MENTION DOMESTIC ENGINEERING

WHY WE MAKE IT

BECAUSE BY SO DOING WE FILL A WANT AND AT THE SAME TIME MEET A STRONG DEMAND.

THE ALTON CLOSET BOWL

IS WITHOUT EQUAL FOR PUBLIC USE.

SOLID FLUSHING RIM.
MASSIVE BOWL.
HEAVY BASE.

Write for Circulars.

PATENTED

FIG. A. 216. THE ALTON.

WHY YOU WANT IT

BECAUSE IT IS THE MOST NEARLY PERFECT PRODUCT OF THE SANITARY POTTERS' ART AND OF THE SANITARY ENGINEERS' SCIENCE.

THE WATROUS AQUAMETER

IS A PERFECT ACTING FLUSHING VALVE DISPLACING BY RIGHT OF SUPERIORITY THE HIGH TANK CLOSET.

WE PROTECT ALL USERS OF OUR GOODS AGAINST INFRINGEMENT SUITS.

Nos. 227-237 Washington St. **FEDERAL COMPANY** CHICAGO, ILLINOIS

BRASS FITTINGS

Standard Weights Tapped True

We manufacture and carry in stock all of the leading sizes

MALLEABLE BEADED PATTERN BRASS FITTINGS, MALLEABLE PLAIN PATTERN BRASS FITTINGS
Rough, Tinned, Dipped, Polished, Nickel-Plated, with iron pipe standard threads, also fine threads.

CONE JOINT BRASS UNIONS, HEAVY PATTERN MADE CORRECTLY
Round ends, Octagon ends, iron pipe threads and fine threads. Rough, Polished or Nickel-Plated.

FITTINGS FOR PLUMBERS' TUBING
Polished or Nickel-Plated, 1¼ inch and 1½ inch, 45° and 90° elbows with fine threads, also other styles usually used.

NOTE:—Our New Fitting Catalogue "F" will soon be ready for distribution. Get your name on file for a copy. Sent free for the asking.

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SOLE MANUFACTURERS

FACTORY AND GENERAL OFFICES.
BLOOMFIELD, N. J.

SALES OFFICE
13-21 PARK ROW, NEW YORK CITY

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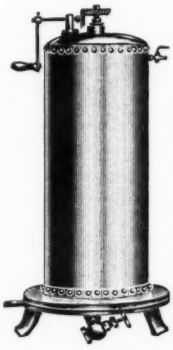

Dirty Water

is bad enough to wade in but it's a lot worse to drink. That's why a good filter is so easy to sell. That's why so many plumbers make a lot of extra profit without any extra work.

WRITE US FOR TERMS.

STEWART FILTER CO.,
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Globe 1906 Leader Closet Seat

ALL THE GRAIN RUNS ONE WAY

No danger of breaking or shrinking or swelling.

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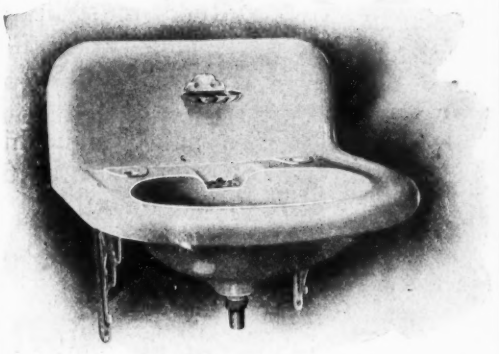
GLOBE FURNITURE CO., Ltd.
NORTHVILLE, MICH.

BARNES'
Porcelain Enameled Ware
SELLS ITSELF.



It is so good, so attractive, so pleasing in every way, that people *can't help but like it*. Send for booklet.

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M. I. W. Boiler Stands

Showing Adjustment.

Architects
Plumbers
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Builders
Like
Them

Patented.

If space in your stock room is an object this stand should have your consideration

Ready for Shipment.

Modern Iron Works
Quincy, Ill.

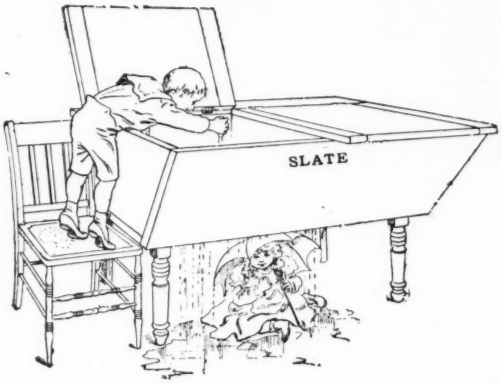
Write for Prices.

We Ship Promptly.

MENTION DOMESTIC ENGINEERING

People are getting wise

They now know that laundry trays and kitchen sinks must be impervious, non-porous, easily cleaned, beautiful to the eye — sanitary as well as handsome. They know the wooden tray is a nasty makeshift. They know now they want the



Alberene Stone

and every jobber in the United States can instantly supply you. But be careful to specify "ALBERENE". Catalogue free.

Alberene Stone Co., 54-60 N. Clinton St., Chicago.

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Perfect Printing Plates Please Printers

SPECIAL ATTENTION GIVEN TO OUT-OF-TOWN CUSTOMERS
LET US SUBMIT SAMPLES AND PRICES ON THAT NEW CATALOG

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164-170 South Clinton Street

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Telephones: Main { 4757 / 4777

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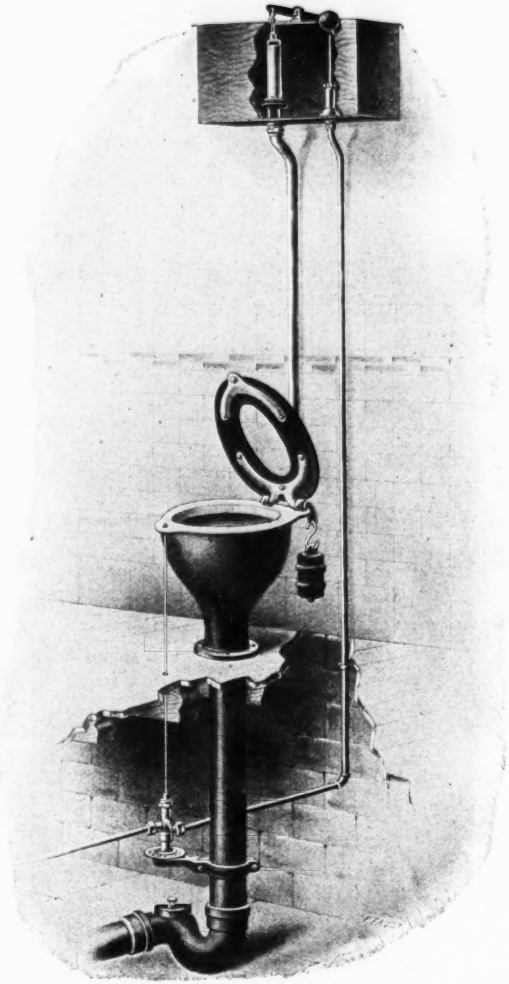

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"WE HAVE IT"

AN ABSOLUTELY

Frost Proof Combination

Designed to meet the new requirements of the Philadelphia Bureau of Health.

"The Acme of Simplicity"

A FEW WINNING POINTS

Low in price. Superior in every way to the many so-called anti-freezing closets. Flush is strong and direct. Minimum of working parts. No ball cocks or washers.

Fleck Bros. Co.

Office and Showrooms

44-50 North Fifth Street

Lead Works and Warehouse

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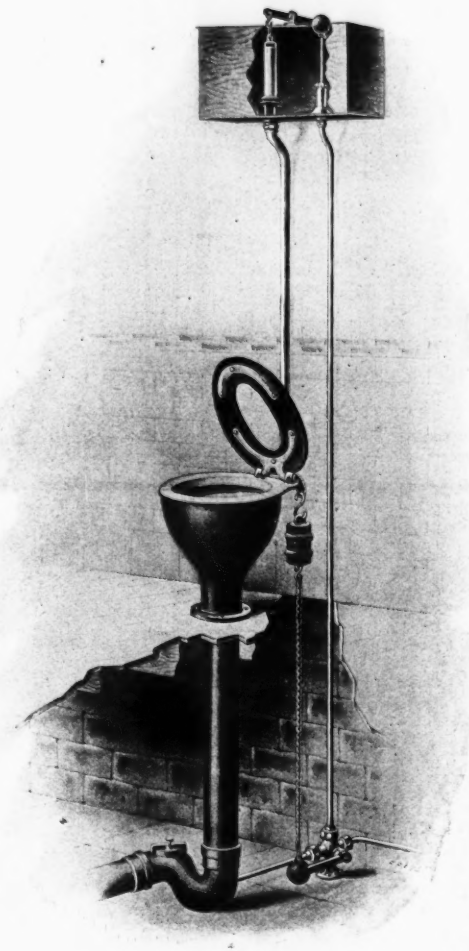
PHILADELPHIA, PA.

We carry a complete stock of Plumbing and Steam Supplies. No matter what you need, "We have it." Try our RUSH ORDER Department.



COMBINATION NO. 2.

$2.50 NET

"Why in Halifax don't you send up and fix those pipes? You know we can't get along without water. You haven't torches enough to care for all! Great Scott! Do you mean to say you haven't anticipated troubles of this kind? Well, well, **you can cancel my order. Mr. Johnnie-on-the-Spot can do it now,**" This is only a sample of what frequently happens **and away goes your customer and the prospective profits.** The No. 31 is the best torch on earth for this work and you should have several on hand. Jobbers sell at factory price under our guarantee: "Your money back if you are not pleased."

Clayton & Lambert Mfg. Company

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$2.50 NET

No. 22 Imperial Hot Blast Blow Torch

The same today as you have always had. Satisfaction given or money refunded. Jobbers sell at factory price, or we ship direct if cash accompanies the order.

THE TURNER BRASS WORKS

43 N. Franklin St., Chicago, U. S. A.

Champion Sewer Rod

Combines Two Good Things in One—the old style and the *"Spear Point"* both—and for this *"Spear Point"* we don't charge you one cent extra. **Note these prices below**

25 ft.	40 ft.	50 ft.	60 ft.	75 ft.	100 ft.
$1.50	$2.00	$3.00	$3.50	$4.00	$5.00 net

David Hymes, 215 Lake St., Chicago

Solder—

What it is, How to make it and How to use it. By W. A. BRADFORD, of Boston, Mass. This booklet cannot fail to be of benefit to the plumber who studies it carefully, Price 10 cents, prepaid.

Domestic Engineering, 58-64 N. Jefferson St., Chicago, Ill.

It doesn't make any difference what kind of a man you want, if you put an "ad" in our Classified Columns you can find him. The cost is only 10 cents a line. A small investment, but a big opportunity.

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734 GATES AVENUE,
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Manufacturers of

LEATHER, RUBBER FIBRE, PASTE-BOARD AND FELT

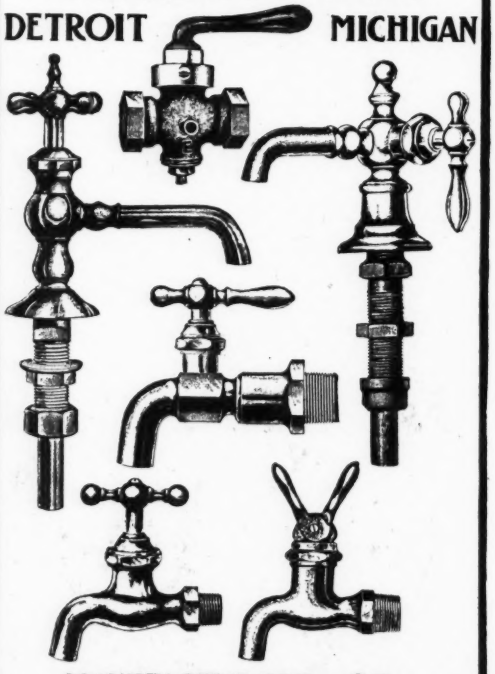
WASHERS

FOR WATER, OIL AND MECHANICAL USES.

SEND US SAMPLES OF SIZES YOU USE AND WE WILL QUOTE YOU PRICES'

EAGLE BRASS WORKS

DETROIT MICHIGAN



MANUFACTURERS OF GOOD PLUMBERS BRASS GOODS

THE EVER RELIABLE

Clean Sweep Traps

have

GOVERMENT INDORSEMENT

Made in Brass and Lead

DETROIT SANITARY SUPPLY CO.

SOLE MANUFACTURERS

27 & 29 Jefferson Avenue, Detroit, Michigan.

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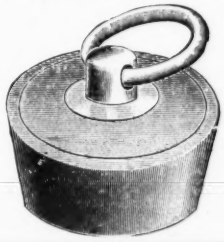
Canfield

The Mark Found Only On Good Goods.

It seems almost unnecessary to say that our stoopers are the standard others set the mark of excellence by. We have made them so long and so well that "Canfield" on the box tells the story and satisfies the buyer. Always specify "Canfield's" when you order rubber goods of your jobber.



H. O. Canfield Co. Bridgeport, Conn.

K.V.A.

Closet Tanks & Seats Are Right

BECAUSE—They are built from lumber seasoned in our own yard, and thoroughly dried in modern, up-to-date dry kilns.

BECAUSE—Our brass trimmings and valves are made in our own factory; the threads are standard and the patterns are kept, so that you will be able to get repairs that will fit perfectly ten years hence.

BECAUSE—We do not cut on quality to save a few cents on each item entering into their construction, such as glue, filler, varnish and rubber goods.

BECAUSE—Our goods are made by skilled workmen, who have been educated to the Knott-Van Arnam standard of excellence, and know that nothing but perfect work will be accepted.

If you are not handling these goods WHY NOT send your order to

KNOTT-VAN ARNAM MFG. CO.
FT. WAYNE, IND.

TRIED AND TESTED—ALWAYS SATISFACTORY

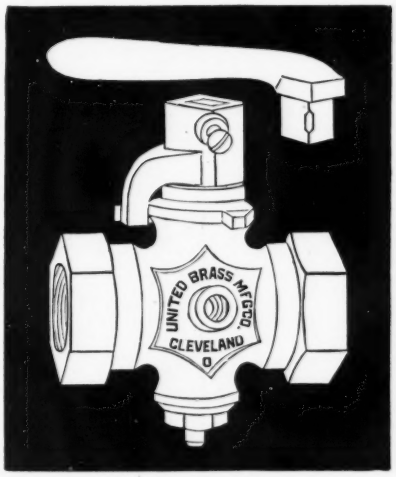
United

Stop and Waste Cocks used by Leading Plumbers

Everywhere

Unite with United Brass Goods

Finest on the Market



Our line consists of
Stop and
Stop and Waste Cocks
Compression
and
Fuller Work
Soldering Nipples and Unions
Sill Cocks
Valves
N. P. Traps
etc.

A Trial Order will convince you that United Goods are the Best

Catalogue and Prices on request

UNITED BRASS MFG. CO., - CLEVELAND, OHIO

MENTION DOMESTIC ENGINEERING

BARRETT SPECIALTIES

TIDEWATER AND SEWER TRAPS, O. D. BACK WATER VALVES, CLEANOUTS, GREASE TRAPS BARRETT SPECIAL FITTINGS. BRASS RAILING, IN ANY FINISH

JAMES BARRETT MFG. CO.

Manufacturers and Wholesale Dealers in Plumbers' Supplies

48-50 Pearl St. **BOSTON** 209-11 Franklin St.

Sewer and Tide Trap.

GRAND TRUNK RAILWAY SYSTEM
SOLID THROUGH TRAINS
BETWEEN
CHICAGO, BUFFALO, NEW YORK and PHILADELPHIA
"VIA NIAGARA FALLS,"
Also to BOSTON via the important business centers of CANADA and NEW ENGLAND.
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CHICAGO.

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Erie Railroad System—New York to Chicago

The Erie Railroad System's Industrial Department has all the territory traversed by the railroad districted in relation to resources, markets and advantages for manufacturing, and can advise with manufacturers of specific products as to suitable locations, furnishing them with current information of a comprehensive nature, dealing with the project in its full relation to manufacture and commerce. Address

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The Growing South

No other section is forging ahead so fast as the Southeastern states, in agriculture, horticulture, factory building and general progress. The last year's record along the

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of investments in factories and improvements was over $119,000,000; for four years, $464,000,000,

Splendid Opportunities exist in Alabama, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Virginia; and in Southern Illinois and Southern Indiana, for investments of all kinds; in timber, mineral and other lands. **Factory Locations** Where all conditions are favorable for making and marketing iron and steel and their products, all kinds of wood-using articles and nearly every other line of industry.

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Better Location than Yours

Would be in

The South

and the Seaboard *Magazine of Opportunities*, special Southern edition will prove it.

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AMERICAN BRASS WORKS

426 TO 430 PLUM ST.

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Manufacturers of

Connected Wastes and Overflows
Standing Bath Wastes
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Wash Tray Wastes

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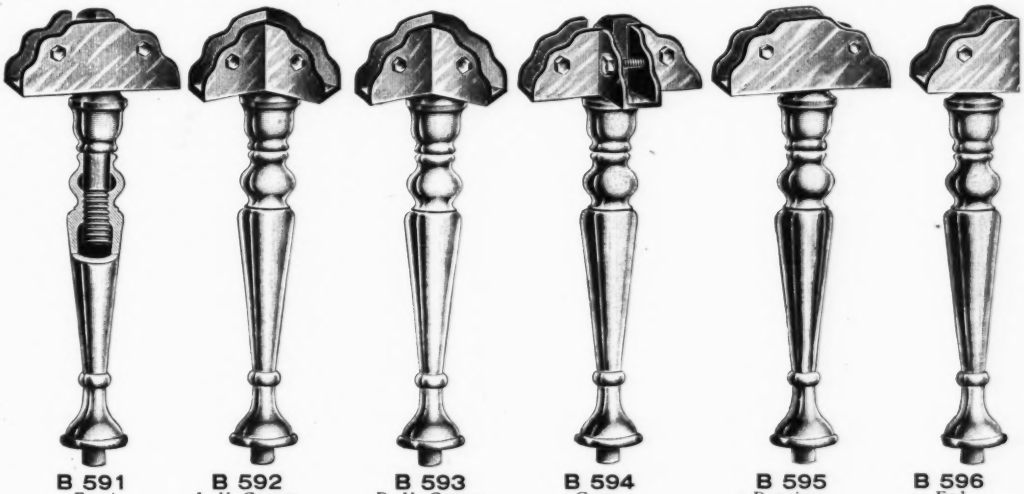
THOS. H. HUTCHINSON,
No. 101 BEEKMAN ST., NEW YORK

Cast Brass Adjustable Legs for Marble or Slate



B 591 Front
B 592 L. H. Corner
B 593 R. H. Corner
B 594 Cross
B 595 Running
B 596 End

All the above legs set 12 inches high with adjustment of one-half inch either way. In ordering always give thickness of marble or slate. Write for our catalog B, just issued.

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The "Niagara" Hydrant

EASY OF REPAIR

All working parts including spout and waste made of brass. Valve so constructed that proper amount of water wastes at the proper time.

LOW IN PRICE AND PROMPT DELIVERIES

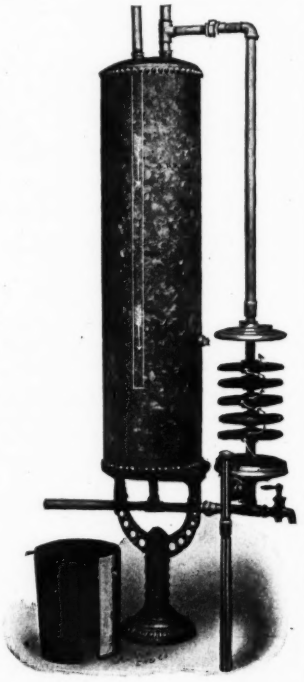
Also Niagara Self-Closing Hydrants and Street Washers.

Macungie Brass & Mfg. Co.

MACUNGIE, PA., U. S. A.

Patent Pending.

Fire King GAS WATER Heater



connected to side of boilers without interfering with present coal range connections. Generate hot water quickly at small cost. These heaters give satisfaction where others fail. Write for prices and full particulars.

A. Weiskittel & Son, Baltimore, Md.

You Don't

want a mere excuse, or a substitute, or a make-believe — you want the BEST Water Heater on earth—you want the one that is the most effective, durable and economical. Send for our terms and our booklet.

BRIDGEPORT WATER HEATER COMPANY
Bridgeport, Conn.

THE WILHELMI
THE MODERN
TWO BEST BOILERS
The "Wilhelmi" is a high-grade copper range boiler tested to 250 pounds and guaranteed to stand a working pressure of 150 pounds. There can be no better boiler made.
The "Modern" is for use where the pressure does not exceed 100 pounds, as that is the guaranteed working pressure. It is tested to 200 pounds.
BOTH BOILERS GUARANTEED NOT TO LEAK AND AGAINST COLLAPSE
Very attractive Discounts Furnished
For Sale only by Jobbers of Plumbers' Supplies
HAYES MFG. CO., Paterson, N. J.

THE EATON, COLE & BURNHAM CO.

WORKS AND GENERAL OFFICES, BRIDGEPORT, CONN.
MAKE AND SELL TO THE KNOWING
STEEL, IRON AND BRASS VALVES AND FITTINGS
ARE YOU IN LINE ? WRITE FOR SPECIAL DISCOUNT SHEET "13"

READ THE ADVERTISEMENTS

Ideal Solid Porcelain Vegetable Sink

Sink and Back in one solid piece.

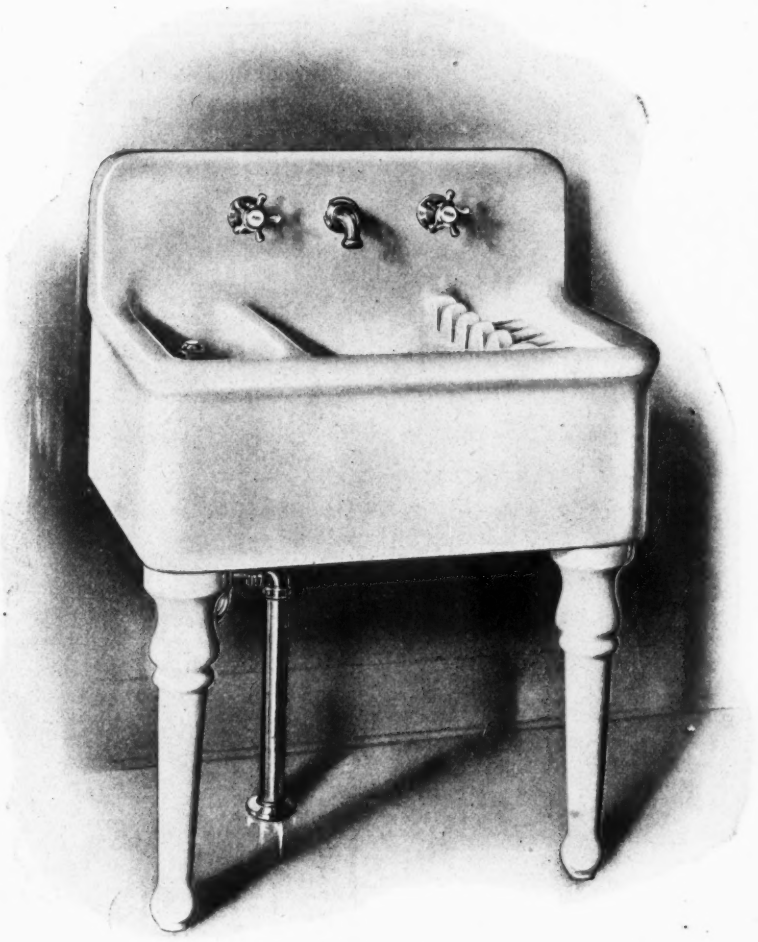
Made of Solid Clay.

No Coating to come off.

Special Shelf for Draining after Washing.

This trade mark appears on every piece.

TRADE MARK
THE TRENTON POTTERIES COMPANY
T P
IDEAL
CO.
TRENTON N.J.



Plate, 861½ G. Design Patented.

We present to the trade a new patented design of Solid Porcelain Vegetable Sink. The center of this sink is used for washing vegetables which are then placed upon the shelf to the right, allowing the water to drain off. The outlet is at the back of sink in the left hand section as shown.

The Trenton Potteries Company

Trenton, New Jersey, U. S. A.

MENTION DOMESTIC ENGINEERING

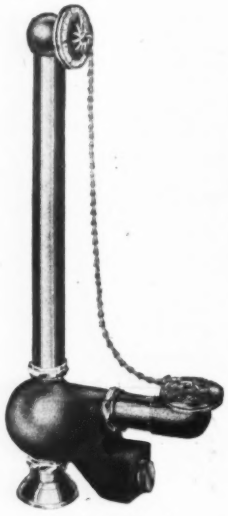
Wolverine N. P. Waste and Overflow

WITH CAST TRAP

DURABLE, ACCESSIBLE, ELEGANT

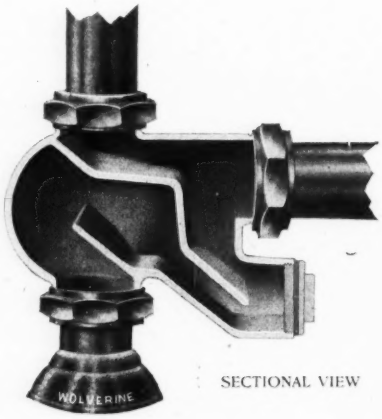
Roughing in, the same as for regular waste and overflow. Will adjust to fit any tub. Shortest piping to foul, between waste and water seal of any trap yet devised. Take notice of seal. Installed cheaper than the old style lead or drum trap. A trial order will convince you.

NO. 6 PLAIN



EXTRA DEEP SEAL

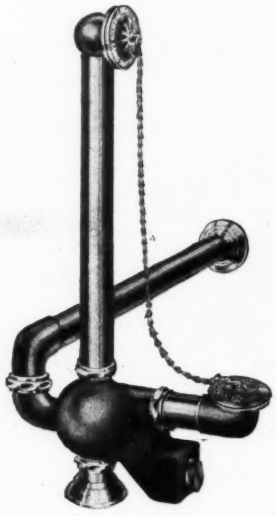
All Nuts, Strainers, Etc. are CAST Brass



SECTIONAL VIEW

PATENTED NOV. 29, 1904

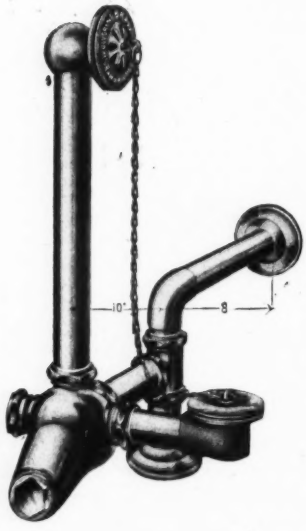
NO. 6 VENTED



EXTRA DEEP SEAL

Will Adjust to fit any Tub

NO. 7



Good Capacity
Deep Seal
Convertible
Either
Right or Left
Hand

Adjustable Waste
Adjustable Vent
Vent
Either
Ground Joint
or
Slip Joint

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WOLVERINE BRASS WORKS

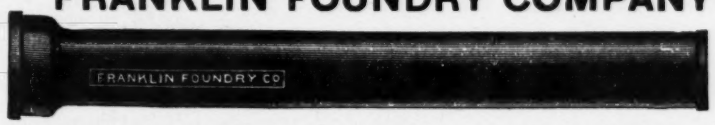
MANUFACTURERS

GRAND RAPIDS, MICHIGAN.

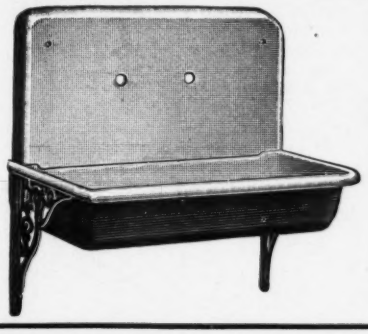
SOIL PIPE

And Soil Pipe Fittings

FRANKLIN FOUNDRY COMPANY



1155 S. PAULINA STREET, CHICAGO, ILL.



"THE CAST SINK MUST GO"

"Columbus" & "New Era"

WROUGHT STEEL SINKS

Rolled Rim and Flat Edges. Painted, Galvanized, Blue Enameled, Grey Enameled, White Enameled.

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THE KILBOURNE & JACOBS MFG. CO.
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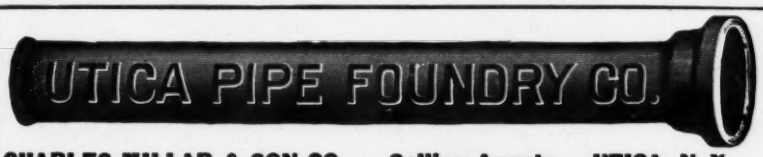

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"Utica Pipe is the Best."

Cast iron soil pipe. Cast iron water pipe. Plumbers' supplies and lead pipe.

PIPE STRAPS

Single or Double

Brass or nickel plated with rubber bumpers

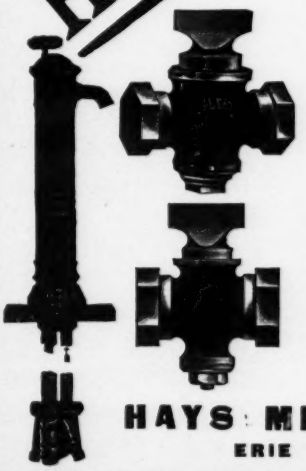
Send for Catalogue of Plumbing Specialties

The Smith & Egge Mfg. Co.
BRIDGEPORT, CONN.

"The Goods That Please"

Est. 1869 Inc. 1893

HAYS



Over 200 Standard Staples in Brass and Iron Fittings for Plumbing Water Steam and Gas

HAYS MFG. CO.
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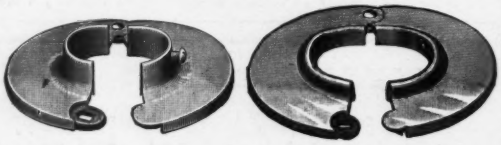
Use the Best Molding Machines

E. H. MUMFORD CO.
17th & Callowhill Sts.
PHILADELPHIA, PA.

RADIATOR and HEATER DRILLS. The Bickford Drill & Tool Co., Cincinnati, Ohio, U. S. A.

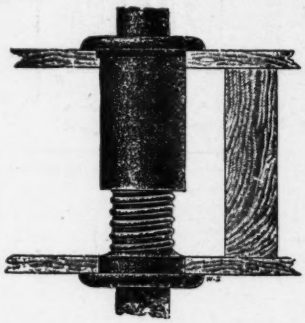
Ceiling and Floor Plates



Regular A. J. Beaton Plates and other varieties. All copper plated before being nickel plated. Seven different patterns of set screw and spring plates from 3/8 inch size to 8 inches.

Send for Catalog and Prices.
The Old Original Company.

The Beaton & Corbin Mfg. Co.
SOUTHINGTON, CONN., U. S. A.



NELSON Floor Thimble

N. O. NELSON MFG. CO.
St. Louis, Mo.

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TANK LININGS FOR WATER CLOSETS
PAT. APP'D. FOR

are guaranteed for five years against any water in Domestic use.

If one leaks because of faulty workmanship or material during that period, we will replace it and pay reasonable amount for time necessary for the plumber to make the change.

Should the Tank Shell be ruined because of such a leak, we will pay for it.

We can do this because REMACO linings are not destroyed by *any water*.

Forty years' experience with these materials has proven this to us.

Insist upon part of your combinations being lined with REMACO and you will soon use nothing else.

Reynolds Mfg. Co.
GRAND RAPIDS, MICHIGAN

ROLLIN C. WILSON, Sales Agent
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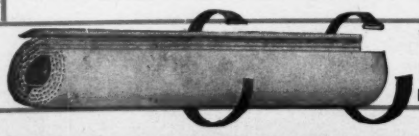
Your Success

depends upon what you can do and do do for other people. **Our Success** depends upon what we can do and will do for you. Try us. Our customers always stick after they try us once. There must be a reason. Send for samples.

The Forest City Brass Works
Cleveland, Ohio



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High Quality Low Discounts
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